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International
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Orthodontia

A NEW AND SCIENTIFIC METHOD OF PRODUCING TEMPOROMANDIBULAR ARTICULATION RADIOGRAMS

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ONLY after checking all the available references to the various methods of obtaining radiographs of the temporomandibular articulation did it seem advisable to use the word new in the title of this presentation. Perhaps even now a reader may prove the method not to be new. Should this occur, it is hoped that the scientific manner of producing such pictures here discussed will be of some assistance to those interested in the use of radiographs of this joint. Rogers[1] sums up the discussion following the reading of a paper on this subject as follows: "As a point of diagnosis, I think that you are all convinced that radiographs of the temporomandibular articulation must certainly now become one of the routine practices in your office. By so doing, we shall improve our technic and check on our results."

As a review of some of the requisites of correct radiographic technic let us first consider the following definition. A radiogram is the record of a shadow cast by a radiopaque object interposed between the source of the x-rays and the film. Like all shadows it is often a distorted reproduction of the object. We find the size and shape of this shadow depending on several factors as follows:

1. The divergence of the x-rays as they leave their source.
2. The distance between the object and the source of the rays.
3. The proximity of the film to the object.
4. The relation of the object and film to the midcentral ray. (Angulation.)

Considering these points, we find the first two to be closely related. That is, since x-rays do diverge immediately upon leaving their source, the more distant the object, the more nearly parallel will be the rays passing through it, thus resulting in a shadow with practically no distortion. In other words, the shadow cast will be almost the exact size of the object. Referring to the third

point, however, we find the opposite to be true; that is, in order to secure a shadow the same size as the object the film must be as close to the object as possible. Turning now to the last point, we may say that the midcentral ray should pass through the center of mass of the object and be at right angles to the plane that bisects the angle formed by the film and the object. If the film can parallel the object, the most ideal situation ensues, for then the midcentral ray will be at right angles to both the object and the film. In addition, the object must be oriented with respect to the midcentral ray in such a manner that the shadow cast will be that of the view desired; that is, if an exact profile view is wanted, only that particular surface should be presented to the anode and film.

In summary, a specific example may be given thus: if a small object such as a solid steel block ¾ of an inch long, ⅜ of an inch wide and ¼ of an inch thick (Fig. 1) is interposed between the anode of an x-ray and a film, and if an undistorted radiograph of the exact end view of the block is desired, the nearest approach to this is obtained when the following four conditions exist:

1. The exact end view is presented to both the anode and the film.

2. The anode, or source of the rays, is far enough distant to cause parallel rays to pass through the block.

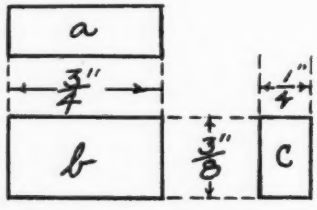

Fig. 1.—Drawing of steel block. *a*, Top view; *b*, side view; *c*, end view.

3. The film is in contact with the opposite end of the block and parallel to it.

4. The midcentral ray passes through the center of the mass of the rectangular shaped surface presented in the end view of the block and is at right angles to this surface and to the film.

When these four conditions are met, the radiograph should be as nearly the same size and shape as the rectangular end of the block as it is possible to produce within the limits of radiographic technic. If, on the other hand, any one of these conditions is not met, the shadow cast will not resemble the shape of the rectangular end and the radiograph produced will be distorted.

With these conditions in mind, the problem of radiographing the temporomandibular joint was attacked. It was then necessary to determine two things, namely:

1. What angle or angles do the condyle, the glenoid cavity, and the eminentia hold with respect to the head?

2. Could a radiograph of these parts be taken in such a manner as to satisfy all four of the conditions listed and conceded to be requisite to the most accurate radiographic technic as far as physical relationship of film, object, and source of rays is concerned?

In order to answer the first question a study was made of some two hundred and fifty skulls and about sixty cadavers which were property of the anatomy department of the College of Medicine at the University of Iowa. For this study an instrument was devised consisting of a flat wooden base and four upright legs for support of a framed glass (Fig. 2). On the glass were etched two lines at right angles to each other and a protractor with the shorter horizontal line, as its base. All the etched lines were filled with black India ink to make them more discernible.

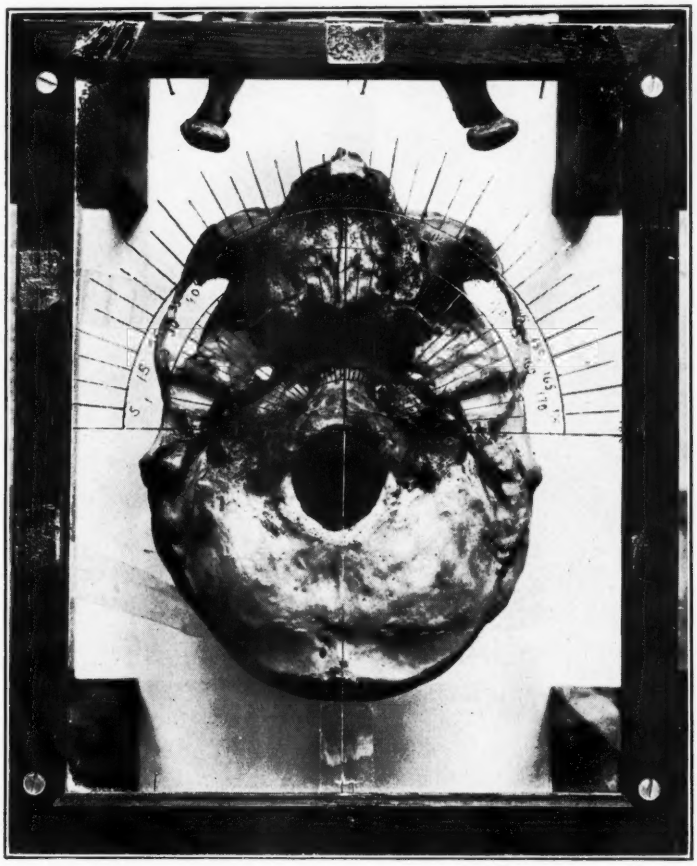

Fig. 2.—Cranium and mandible mounted in instrument devised for measuring angles of head of condyle, eminentia, and glenoid cavity.

A skull, with the mandible removed, could then be slipped under the glass and held in such a manner that the base of the protractor passed through the transmeatal plane, which is the plane lying at right angles to the median sagittal and passing through the midpoints of the external auditory meati. The skull was also oriented so that the vertical line was caused to lie over the median sagittal plane. In this manner it was easily possible to read directly the angle that the eminentia made with the transverse plane, when the center of rotation was at the intersection of the midsagittal and transverse meatal plane. As can be seen in Fig. 2, this angle is 20 degrees.

The eminentia, through another set of measurements, was found to have a downward and inward angulation of about 8 degrees with the Frankfort plane. It follows, of course, that the glenoid cavity has the same angulations as the eminentia.

Similarly, the head of the condyle when studied, portrayed, in the majority of cases, the same angulations; although some offered considerable variation in shape, and consequently in angulation, as might be expected, at least by those having made a study of this joint.

Having determined these angulations of the various parts of the joint, we find that, in order to comply with the four previously mentioned conditions and thus produce a true radiograph of the eminentia and glenoid cavity and an exact profile of the condyle, the skull or patient's head must be oriented on some horizontal plane such as the Frankfort, then rotated horizontally 20 degrees and tipped laterally 8 degrees, while all the other physical relationships between the film, area to be radiographed, and the source of the x-rays are correctly held.

The problem which confronted us at this time was whether we could produce a true profile view of the condyle knowing that some assert that the head

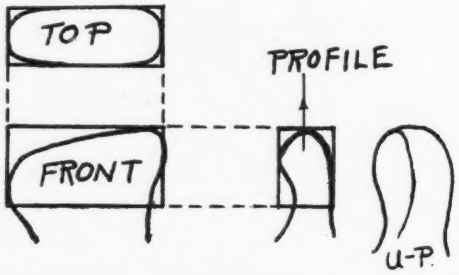

Fig. 3.—Outline of block superimposed over head of condyle. *u-p,* Distorted untrue profile view.

of the condyle is so variable in shape and angulation that it would be impossible to obtain, by any set rules, a correct profile view. Although the condyle varies in some cases, this, as stated before, was not found to be true of the majority, the head of the average condyle being similar to the solid steel block previously referred to, the measurements of which were purposely chosen to be the same as the average condyle head. The profile view of the condyle head would then correspond to the end view of the block, and the conditions necessary to obtain an exact radiograph of either one are the same (Fig. 3). Therefore it is much better, if possible, to take the radiographs in a way that is applicable to the majority of cases and that follows the rules of the best radiographic technic rather than to introduce angulations which are contrary to ideal radiography and which only add another variable to a technic in which constants are so important.

The most important fact to keep in mind is that regardless of how variable may be the shape and angulation of the condyle head, we have noted that the angulations of the eminentia and glenoid cavity remain constant in relation to the patient's head. Therefore, when we use correct angulations in radiographing the eminentia and glenoid cavity, if the condyle head is like the ma-

jority, we shall obtain a profile view of it in correct relation to the cavity and eminentia; and, if it is unlike the majority, the discrepancy will be shown, and we shall still obtain it in its correct relationship to the rest of the joint.

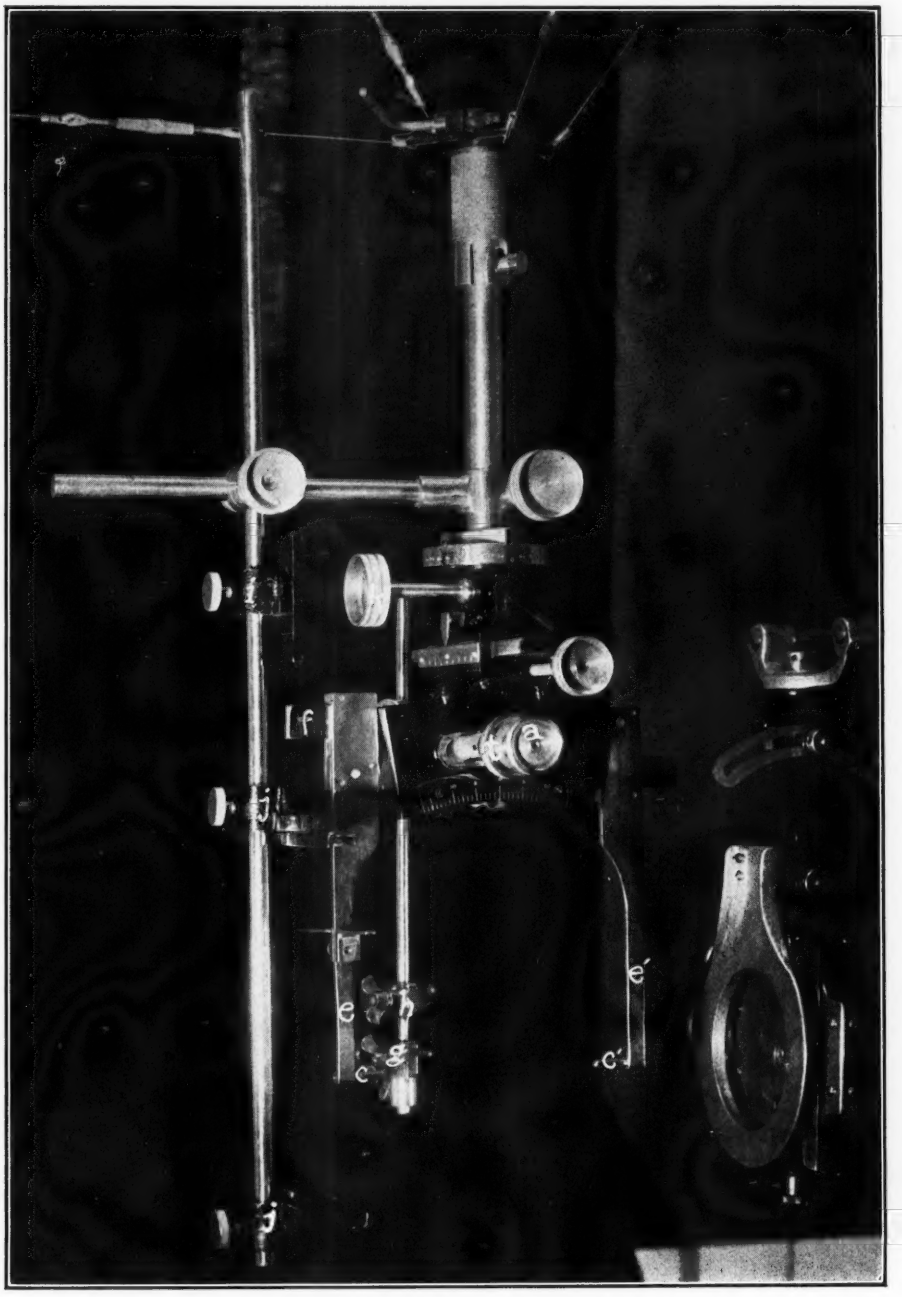

Fig. 4.—Close-up view of head positioner.

In answering the second question it was still necessary to decide whether we could apply ideal radiographic technic to this joint, using the correct plane and angulations, and not have certain other structures superimpose and thus cover up detail.

As a preliminary study a skull was oriented and radiographed with gratifying results. Following this, several exposures were made using graduate students as subjects. The results again indicated the practicability of the method.

Several things as yet were desirable, one of which was an apparatus which would position the patient's head and the cassette in correct relation to each other and hold them immobile, and also make it possible to replace the head in exactly the same position at a future date. One of our problems was to make the apparatus usable for the dentist from the standpoint of expense and space required for the equipment.

The apparatus finally evolved, consists of a head positioner with cassette holder (Fig. 4), which is described in detail in another article.[2] The head positioner with cassette holder is suspended above the dental chair from a ceiling support; and, since it can be taken from and replaced into its support readily and quickly, it is out of the way when not in use. The lowest point of the ceiling support with the head positioner removed is at least seventy-four inches from the floor.

The patient is seated in the chair and raised until his external auditory meati or ear holes are on a level with the small ear rods, $c - c'$. By turning the knob, a, these ear rods at the lower extremities of the arms, $e - e$, move toward each other simultaneously and enter the ear holes, thus automatically centering the head. Calibrations on the arm, f, indicate the distance that the ear rods enter the ear holes, making it possible always to use the same amount of compression for subsequent pictures except in certain instances in which we must allow for growth.

The head is then adjusted vertically so that the pointer, g, touches the lower border of the bony orbit. The stabilizer, h, is then adjusted to press lightly against the head at the nasion in order to preserve this position, and the orbital pointer is released. The head has thus been oriented on the Frankfort plane.

The film contained in a cassette is now positioned. The cassette holder is completely adjustable so that the cassette may be brought into relation with the arm, e or e', depending on the joint to be exposed, and positioned through the use of a small square, s, so that the film will cover the desired area and will be at right angles to the midsagittal plane of the patient's head.

Either a small occlusal cassette $2\frac{1}{4}'' \times 3''$, equipped with high speed screens and a film cut to fit from a larger ultraspeed film, may be used, or a larger cassette will serve and may be positioned so that a small cut portion of film will fall over the area to be radiographed. If the occlusal cassette is to be used, it is inserted in the small single cassette holder, i, or if a larger one is to be employed, the double cassette holder, $j - j'$, is used.

If a dental x-ray machine is used, the cone is adjusted so that it will just miss the surface of the arm, e or e', opposite the joint to be exposed and will be on the same level as the ear rods and so that the midcentral ray will also be at right angles to the midsagittal plane of the patient's head.

This head positioner is so designed that it will duplicate the angulations of the joint as found in the previous study. Thus it can be rotated on the horizontal plane and tipped laterally, the center of rotation being the junction of the midsagittal and transverse meatal planes midway between the ends of the ear rods.

Since the previously computed angles can be duplicated with the head positioner, we proceed to this next step as follows. In radiographing the left joint, the operator, when standing in back of the patient, releases the head holder for rotation on the horizontal plane by turning the knob, *k* (Fig. 4), after which the head and the positioner are rotated counterclockwise 20 degrees as indicated on the calibrated disk, *l*. This then causes the midcentral ray to enter

Fig. 5.—Profile radiograph to illustrate this use of the head positioner and cassette holder.

the right side of the head just about distal to the mastoid, on the same plane as and in a direct line with the eminentia and condyle head. Thus both the rays and these structures are now at right angles to the film, and in the average case the exact profile of the condyle is procured. Now by releasing the knob, *t*, the head is tipped laterally in a counterclockwise manner 8 degrees, as indicated by the calibrations under this knob.

At this time, all the conditions of correct and scientific radiographic technic are complied with, since the relations of all parts are correct and the film and the patient's head have been made immobile.

One additional factor which lends brilliance to the radiograph may be profitably discussed. This is the use of diaphragms, cones, or the Potter-Bucky

A. B. C.

Fig. 6.—*A*, Physical rest position, teeth closed. *B*, Physiologic rest position, teeth slightly apart, relaxed state. *C*, Mouth wide open, condyle head completely out of fossa. These three views of the joint are taken routinely.

diaphragm. The center of the aperture of the diaphragm or cone should be exactly in the line of the midcentral ray, and the size of this opening is computed by the following formula:

$$\frac{\text{anode – diaphragm distance}}{\text{diameter of aperture}} = \frac{\text{anode – film distance}}{\text{diameter projected circle}}$$

Suppose we want the radiograph to include an area two inches in diameter when employing a 14″ anode-film distance and 3″ anode-diaphragm distance. What would be the diameter of the diaphragm or cone aperture?

$$\frac{3}{x} = \frac{14}{2} \text{ then } 14x = 6 \text{ and } x = \frac{3''}{7} = \text{diameter of aperture}$$

A complete discussion of diaphragms may be found in the medical division of Radiography and Clinical Photography, Eastman Kodak Co., for July, 1933; while all the known approaches for obtaining radiographs of the condyle are referred to in the September issue of that same year.

In conclusion, I wish, first, to repeat that this is the only method known to me in which all the requirements for the best radiographic technic have been applied to a lateral view of the temporomandibular joint; second, to state that, regardless of the apparatus one may choose to orient the head and immobilize it and the film, the method of approach seems worth while; third, to emphasize that by the systematic use of a scientific apparatus of the type herein described, original and check-up radiographs of this area, as well as all other radiographs and photographs of the head, may be more accurately produced.

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2. Higley, L. B.: A Head Positioner for Scientific Radiographic and Photographic Purposes, Int. J. Orth. **22**: 699, 1936.

ACROMEGALOID GROWTH AND DWARFISM

CLINTON C. HOWARD, D.D.S., ATLANTA, GA.

"INHERENT Growth and Its Influence on Malocclusion" is the subject of a paper presented by the author in 1931 before the American Dental Association.[1] That paper included a report of findings made upon five hundred cases, all having had tonsil and adenoid involvement. The substance of that survey clearly indicated that the faucial tonsil was not responsible for the overgrowth of the mandible. Quoting from Page 644, it is stated:

"In Table 3, our findings were not in accord with the general opinion held by the orthodontic specialty. The ratio of 500 tonsil cases to twenty-one Class III cases certainly offers little ground for the theory that tonsils are responsible for this type of malgrowth. In the twenty-one Class III cases, nine patients, or 42.8 per cent, were definite mouth breathers. In the twenty-one Class III cases, ten patients were Mongolian idiots. (The large number of Mongolian idiots is accounted for by the fact that the Good Samaritan Clinic is primarily an institution for endocrine research. It might be stated that the percentage of Class III cases runs very high among these unaccounted-for individuals.)

"Suppose we discard the ten cases of Mongolian idiots; this would leave 490 tonsillar cases showing the small number of eleven Class III types, or a percentage of 2.2. Further, in the eleven remaining Class III cases, two patients were definite mouth breathers."

Additional evidence incorporated in the quoted article appeared ample in also disqualifying the theory that mouth-breathing was a cause of retruding mandibles, or Class II, Division 1. I made no attempt at that time to explain the etiologic factors responsible for these types of malgrowth of the jaws. It is my purpose at this time to offer evidence that an imbalance of the growth hormone of the anterior lobe of the pituitary body *is the fundamental cause* of the overgrowth of the mandible.

The statistics employed in arriving at this conclusion were obtained from private practice as well as from 3,100 physical records at the Good Samaritan Endocrine Clinic. From these sources 59 cases diagnosed as accelerated growth, or *hyper*-anterior lobe imbalances, were obtained; also 39 cases of retarded growth, or *hypo*-anterior lobe imbalances.

ACCELERATED SKELETAL GROWTH

Accelerated skeletal growth, indicating an advanced growth of an individual, is produced by excessive influence of the growth hormone of the anterior lobe

Read before the thirty-fourth annual meeting of the American Society of Orthodontists, April, 1936, St. Louis, Mo.

of the pituitary body. This theory is accepted by the medical profession. Only recently a text in the form of a symposium was published by the American Medical Association, the title of which is "Glandular Physiology and Therapy." The first three chapters of the treatise deal with the growth hormone of the anterior lobe and its manifestations upon growth processes. I earnestly advise the review of these chapters by every orthodontist.

There are two types of advanced growth which should be recognized in the analysis of such cases. Some unusually advanced people are normal in all proportions and should be classed as normal typal giants. These people will show a genetic history wherein some of their forebears are normally large individuals. This type of gigantism is of no direct concern to the orthodontist's problem; as a matter of fact, they present normal occlusion of the teeth, as well as symmetrical growth and relationship of the jaws.

The other type possessing advanced growth constitutes either the individual in whom the genetic determinators may have been altered by postnatal influence such as infectious disease so as to produce a qualitative or quantitative abnormality of the growth hormone, or the individual in whom heredity furnishes abnormal determinators. It is this type of person who will present abnormalities of the dental arches and jaws. Some will present dental arches having spaces between the teeth, particularly the anterior teeth, such spaces being the result of the overgrowth of the bones involved.

TABLE I

ADVANCED GROWTH

(CONDENSED FROM TABLE II)

Number of cases, 59—Diagnosis—Hyper-Anterior Lobe of Pituitary
Number with acromegaloid growth (Class III)—13
Number of advanced acromegaly (Class III)—1
Number with excess arch width, otherwise normal—6
Number with normal arch and jaw growth—36
Number with slight deficiency of arch width—1
Number with retarded growth of mandible (Class II, Div. 1)—1
Number with normal arch and jaw growth (Class II, Div. 2)—1

Other cases, the ones which constitute a genuine problem to the orthodontist, will present a definite overgrowth of the mandible. I have chosen to designate such anomalies as the spacing of teeth and overgrowth of the mandible as *acromegaloid* manifestations. This coined term implies that these individuals suggest the condition of acromegaly; both result from an excessive influence of the growth hormone. The characteristic skeletal anomalies of acromegaly are lacking in degree, but the jaw and arch features, while varying in extent, are strikingly similar. These malgrowth problems are incorrectible by means of orthodontic mechanical stimulation. The potency of the growth impulse activated by hormone stimulation cannot be completely overcome by mechanical stimulation. My own experience with orthodontic problems of this type shows that, even though they are incorrectible as far as changing the shape and conformation of the mandible, still mechanical stimulation serves as a combating influence to hormone stimulation and, therefore, is valuable in preventing a magnified anomaly.

TABLE II

CASE NUMBER	AGE	SEX	WEIGHT	HEIGHT	SPAN	LONG BONE	TORSO	CELLA X-RAY	ENDOCRINE IMBALANCE	ORTHODONTIC SURVEY JAW AND ARCH GROWTH	STATUS OF HAND BONE GROWTH—X-RAY
1166	15	F	150	64½	66½	32½	32	Neg.*	Hyper-ant. lobe†	Normal	Advanced; closed
805	16	M	200	68	x	35	33	Neg.	Hyper-ant. lobe	Class I—due lost teeth	Advanced; closed
769	15	M	137	73	72½	40½	32½	Neg.	Hyper-ant. lobe	Normal	Advanced; closed
576	14	F	157	67	69½	35	31½	Neg.	Hyper-ant. lobe	Normal	Advanced; closed
812	13	F	129	69½	64½	36	33½	Neg.	Hyper-ant. lobe	Class III	Advanced; closed
1707	12	M	82½	62	x	33	28	x	Hyper-ant. lobe	Normal	Normal
1764	17	M	154	75	76½	38½	36	Neg.	Hyper-ant. lobe	Normal; local Class I	Advanced; closed
1816	13	M	197	69¼	75⅛	36	33	Large	Hyper-ant. lobe	Normal	Normal; open
1823	17	F	173	68½	68½	34	34	Neg.	Hyper-ant. lobe	Normal	Closed
2183	15	M	137	67½	x	33½	34½	Neg.	Hyper-ant. lobe	Normal	Normal
2193	16	M	136	65½	68	31¼	34	Neg.	Hyper-ant. lobe	Normal	Advanced; closed
2194	16	M	135	66½	71½	33¼	34¾	Neg.	Potential gigantism	Normal	Advanced; closed
2247	13	M	141	72½	72	37½	35	Neg.	Hyper-ant. lobe	Normal; local Class I	Normal; open
304	29	F	x	72	71	36	36	Abnormal	Classical acromegalic	Class III	Tufting of first digits
2290	14	M	158	67½	71	33½	34	Neg.	Hyper-ant. lobe	Large arches; wide spacing all incisors	Advanced
2334	15	F	117	69½	71	35	34½	Cl'd ab'sn‡	Hyper-ant. lobe	Local in origin (?)	Advanced; closed
2470	18	M	157	72½	75¾	36½	36	Neg.	Hyper-ant. lobe	Class III	Advanced
2444	13	M	122	63½	67¼	33½	30	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2420	15	M	160	73⅛	73	37¼	35¾	Neg.	Hyper-ant. lobe	Normal; local Class I	Advanced; open
2419	17	M	143	69⅛	73	32⅞	36¼	Neg.	Hyper-ant. lobe	Normal	Advanced; closed
2501	11	F	79	60½	63	31½	29	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2500	13	M	121	68½	68	35½	33½	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2495	15	F	119	63¾	66	31⅞	32⅞	Neg.	Hyper-ant. lobe	Normal	Advanced; closed
2493	8	F	107	58¼	57	29⅛	29	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2531	15	F	136	68⅞	71½	33⅜	35½	Neg.	Hyper-ant. lobe	Normal	Advanced; closed
2624	13	F	114	61⅛	61¾	29⅝	31½	Neg.	Hyper-ant. lobe	Normal	Advanced; partially closed
2667	11	F	112	57	58½	28⅜	28⅝	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2675	12	F	148	63¾	66½	31¾	32	Cl'd ab'sn	Hyper-ant. lobe	Normal	Advanced; partially closed
2681	13	F	135	62	63½	32⅜	29⅝	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2690	9	F	105½	56¾	56¼	26⅝	29⅝	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2728	15	F	112½	68⅛	67	35⅞	34½	Neg.	Hyper-ant. lobe	Class II; Div. 1	Advanced; closed

TABLE II—CONT'D

2846	17	M	131	73½	77½	39½	34	Neg.	Hyper-ant. lobe	Wide spacing between incisors; overgrowth	Advanced; open
2895	13	M	119	64⅝	67½	33⅜	31¼	Neg.	Hyper-ant. lobe	Normal; local Class I	Advanced; open
2931	16	M	121½	67¾	71½	34½	33¼	Neg.	Hyper-ant. lobe	Normal	Advanced; closed except ulna and radius
2985	14	F	101½	63⅜	64¾	31⅛	32¼	Neg.	Hyper-ant. lobe	Normal; Class I, loss of teeth	Advanced; open
3045	16	M	135	70	71½	35¼	34¾	Neg.	Hyper-ant. lobe	Normal	Advanced; partially closed
3040	14	M	119	67½	x	34¼	33¼	Unusual	Hyper-ant. lobe	Class III	Practically closed
3032	16	M	146	69¾	71½	35½	34¼	Neg.	Hyper-ant. lobe	Class I; slight width deficiency	Advanced; open
3017	15	M	129	68⅛	71	34⅛	34	Neg.	Hyper-ant. lobe	Class II; Div. 2	Advanced; open
3014	11	F	151¼	62	64¼	32½	29½	Neg.	Hyper-ant. lobe	Class III	Advanced; open
3003	14	F	93	60	62¾	31½	28½	Neg.	Hyper-ant. lobe	Overgrowth; spacing between all incisors	Advanced; open
1284	13	M	187½	71	72	37½	33	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2139	11	M	148½	59	62½	31¾	28¾	Neg.	Hyper-ant. lobe	Normal	Advanced; open
2177	14	F	197½	63	66½	31	32	Neg.	Hyper-ant. lobe	Class III	Very advanced
2185	5	F	91	45¼	45¾	22¼	23	Neg.?	Hyper-ant. lobe	Wide growth spaces	Very advanced
1888	15	M	174	68¼	70¼	34¾	33½	x	Hyper-ant. lobe	Normal	Advanced; open
2916	13	F	86½	61⅜	67¼	33⅛	28¼	Neg.	Hyper-ant. lobe	Wide spacing of incisors	Advanced; open
2844	17	F	95½	62⅛	64½	31¾	30⅜	Neg.	Hyper-ant. lobe	Normal	Advanced; closed
2056	17	F	115½	62	61	34	28	Neg.?	Hyper-ant. lobe	Class III	Advanced; closed
2093	13	F	188½	65¼	65½	31½	33¾	Neg.	Hyper-ant. lobe	Normal	Advanced; closed except ulna and radius
2101	13	F	220	64½	66½	31½	33	Neg.	Hyper-ant. lobe	Normal	Advanced; partly closed
818	15	M	127½	64	65½	33	31	Neg.	Hyper-ant. lobe	Wide spacing of incisors	Advanced; open
3050	14	M	147½	71	71⅜	35⅜	35⅝	Neg.	Hyper-ant. lobe	Class III	Very advanced; open
Private	16	F	135	65	x	x	x	x	Hyper-ant. lobe	Class III	Advanced; closed
A-Private	5	M	x	51	x	x	x	x	Hyper-ant. lobe	Class III	Advanced; open
B-Private	12	M	135	69	x	x	x	x	Hyper-ant. lobe	Class III	Advanced; open
Private	12	M	135	68	x	x	x	x	Hyper-ant. lobe	Class III	Advanced; open
Private	13	M	146	70	x	x	x	x	Hyper-ant. lobe	Class III	Advanced; open
Private	12	F	120	63⅛	64	32	31	Neg.	Hyper-ant. lobe	Class III	Advanced; closed

The Medical Staff of the Good Samaritan Clinic diagnosed all above cases as advanced skeletal growth due to the hyper secretion of the growth hormone of the anterior lobe of the pituitary body.

***Neg.=Negative. †Hyper-ant. lobe=Hyper secretion of the anterior lobe of the pituitary gland. ‡Cl'd ab'sn=Clinoid absorption. Local=Etiology; local in origin.**

It will be noted from Table I that 57 of the 59 cases present *no evidence of retarded jaw and arch growth.* If the intrinsic activators directing skeletal growth are of an accelerative quality, certainly their influence would affect the size of the jaws and arches.

The next and most important significance presented by Table I is the appearance of 13 acromegaloid cases (Class III). In discussing these cases with particular reference to their etiology, I am introducing an entirely *new concept* which has not heretofore been made a part of medical or orthodontic literature.

Marie, a French physician, in 1886 called attention to a condition of growth affecting the extremities and the face designated as acromegaly. This condition, produced by an imbalance of the anterior lobe of the pituitary, was confined to individuals who had reached maturity. It appears that should the hormone

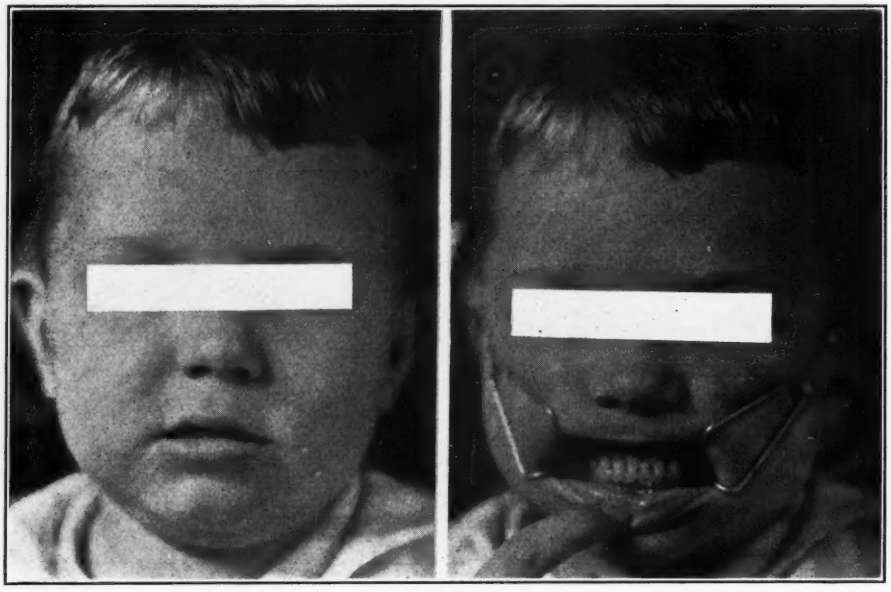


Fig. 1.—Acromegaloid mandibular growth (Class III), child five years old.

growth stimulus continue its influence after the epiphyses have united with their parent bones, classical acromegaly is produced. See Fig. 18.

The group of acromegaloid cases now being recorded range in age from five to seventeen years. Both sexes are susceptible. Our records demonstrate the condition in the caucasian, as well as in the negro race.

Two cases will be discussed in pointing out significant features demonstrated by acromegaloid growth. Referring to Table II, case numbers designated "A-Private" and "B-Private" refer to one boy first presented at age of five. His acromegaloid jaw growth (Class III) and hand bone growth are illustrated in Figs. 1 and 2. Quantitatively, his hand bones are definitely advanced. This boy has been under intermittent orthodontic treatment for eight years. At the age of nine years a second x-ray hand picture was made (Fig. 3), which demonstrated a further magnified hand bone growth. During this period, i.e.,

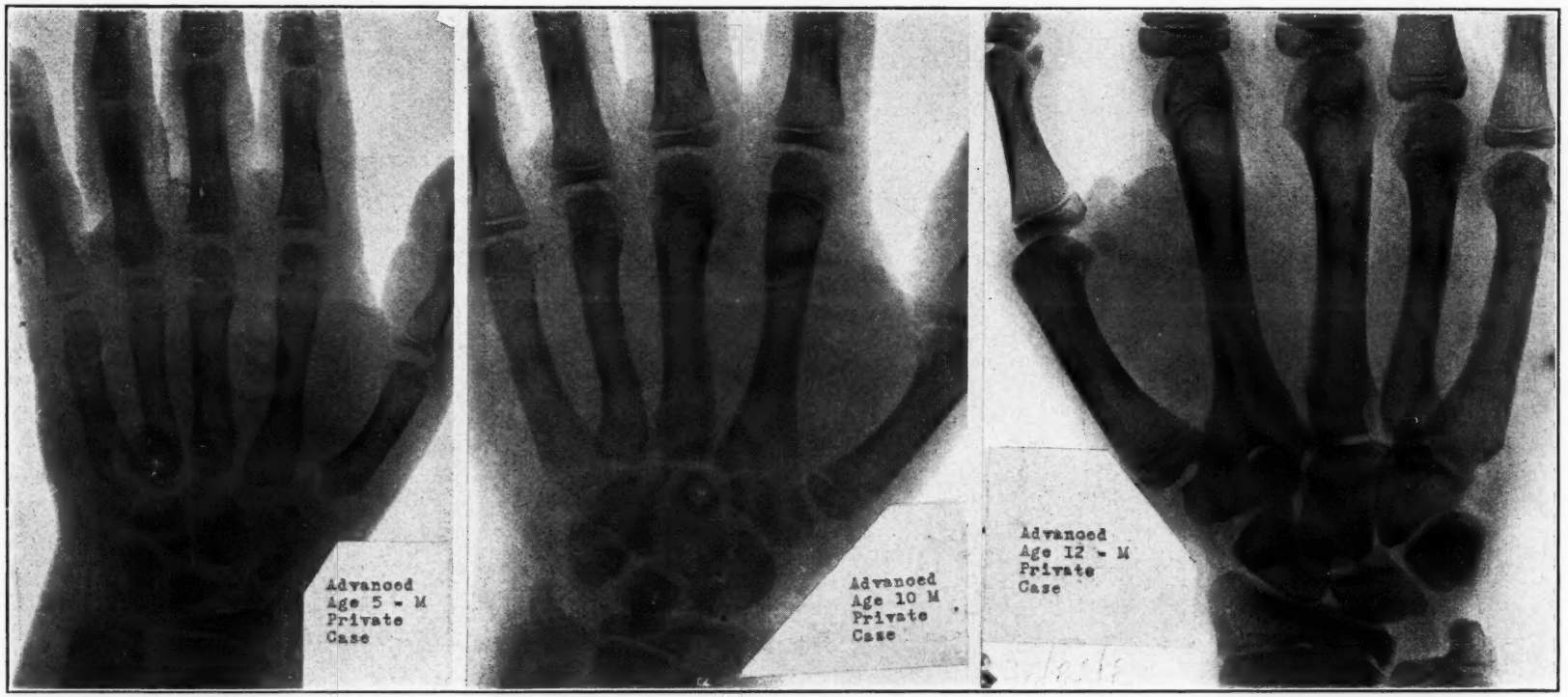


Fig. 2. Fig. 3. Fig. 4.

Figs. 2, 3, and 4.—Hand of boy shown in Fig. 1. Fig. 2, child five years old. Fig. 3, child ten years old. Fig. 4, child twelve years old.

from age five to age nine, mechanical stimulation under my supervision failed to overcome the persistent acceleration of the acromegaloid growth influence. At eleven years of age we obtained a creditable adjustment of tooth occlusion, only to be followed by a complete relapse when pubescent accelerated growth

Fig. 5.—Acromegaloid mandibular growth (Class III), girl twelve years old.

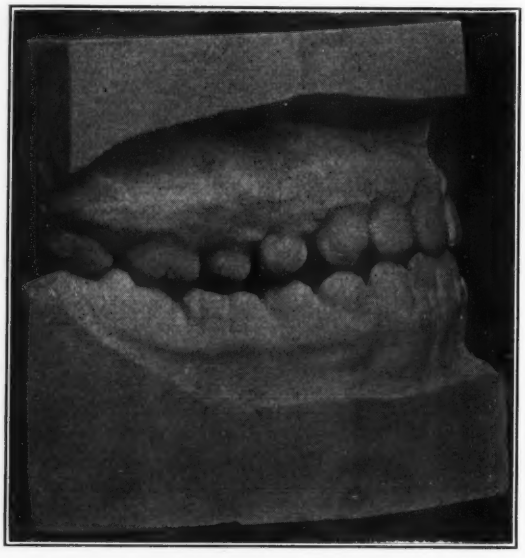


Fig. 6.—Acromegaloid occlusion of patient shown in Fig. 5, twelve years old.

began. The boy is now twelve years old (see Fig. 4). In the past six months the boy has grown eight inches. I predict that his epiphyseal closure will occur at a very early age. A final report will be given at a future date.

The second case offers features of extraordinary significance.[2] This case is designated in Table II as "Private, Age 12—F." The girl applied for ortho-

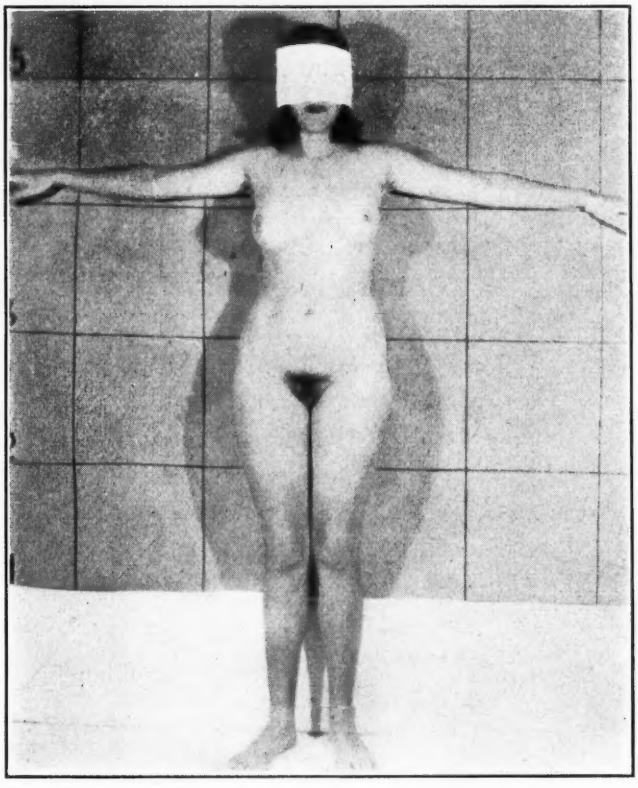


Fig. 7.—Menstruation occurred at age eight and one-half years. At age twelve complete union of all epiphyses had occurred. Same case as shown in Figs. 5 and 6.

dontic services in 1930. Her acromegaloid appearance prompted a study of the individual rather than the employment of orthodontic therapy. The results of the study are as follows:

The case had been observed for three years by a fellow practitioner of dentistry. He noted at the beginning of that period of observation that there existed a definite tendency toward the overgrowth of the mandible. When the girl applied to me for orthodontic services, she presented facial, occlusal and hand bone features as illustrated in Figs. 5, 6, and 7.

Another important feature of this case is the fact that the patient reached puberty at the early age of eight and a half years. Fig. 7 shows the union of the epiphyses with their parent bones at the early age of twelve years and the advanced sex characteristics for this early age. The patient was kept under my observation for a period of three years, or until the age of fifteen. No further evidence of advancement in her body or mandibular growth was noticed, and it was therefore assumed that the imbalance of the growth hormone had become arrested. The case was not placed under orthodontic treatment.

Although the evidence presented in Table II strongly points to gigantism as being a *potential* acromegaloid growth perversion, *gigantism is not the determining factor.* There appears to be *some connection between acromegaloid growth characteristics and the early union of epiphyses with their parent bones.* The growth hormone which is responsible for the classical acromegalic individual is the same activator responsible for Class III acromegaloid mandibular overgrowth. The clinical differences of the two conditions may be assigned to the *difference in the time of onset.* The acromegaloid Class III case occurs during the growing stage while acromegaly occurs after epiphyseal union, or after the termination of skeletal growth.

A much greater volume of evidence will be accumulated which should permit conclusions of a more definite value than is permissible at this time.

RETARDED SKELETAL GROWTH

Table III shows condensed findings on the group of thirty-nine retarded skeletal growth cases. These conditions are diagnosed by the Medical Staff of

TABLE III

RETARDED GROWTH

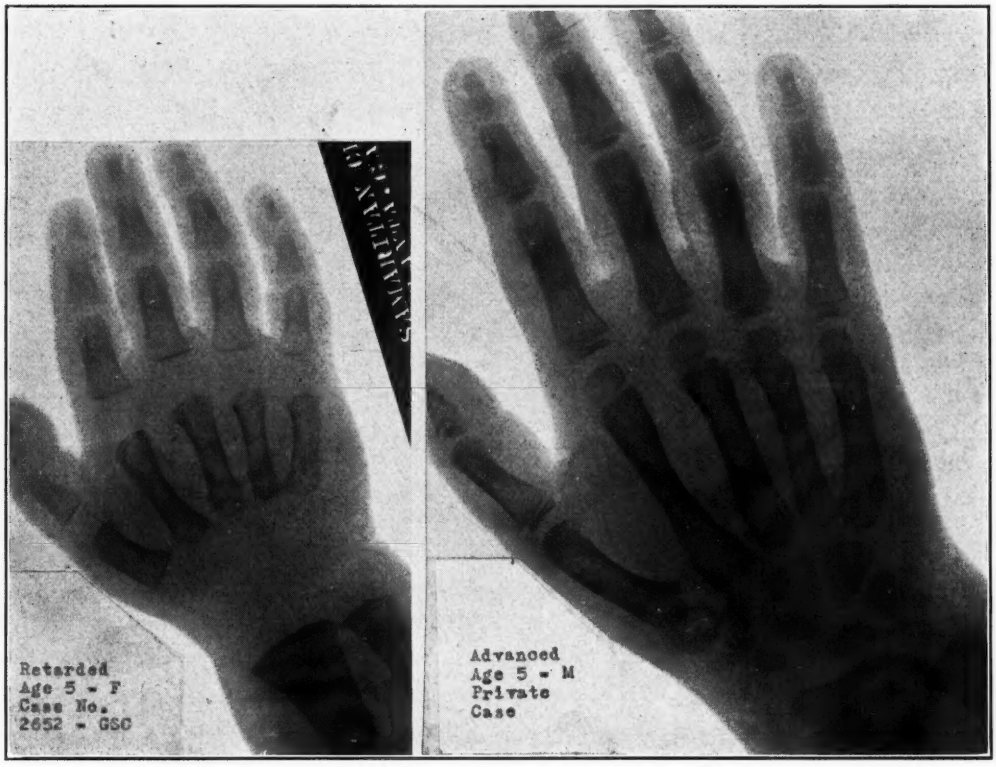
(CONDENSED FROM TABLE IV)

Number of cases 39—Diagnosis—"Hypo-Anterior Lobe of Pituitary"	
Number with narrow arches (Class I)	25
Number with normal arch and jaw growth, normal occlusion	8
Number of Class II, Div. 2 (normal growth of arches)	1
Borderline—Class I	5

the Good Samaritan Clinic as *hypo*-anterior lobe cases. As would be expected, these retarded individuals show the antithesis of the group presenting acromegaloid characteristics.

It might be stated that endocrinologists employ the term gigantism in describing abnormal acceleration of growth *regardless of age*. They also use the term dwarfism as applied to stunted growth whether it be manifested in a very young child or in a matured individual.

In Table III it is seen that of the thirty-nine retarded skeletal growth cases, only eight present a normal growth of the jaws and arches, and in accord with the clinical diagnosis it appears that six of these eight cases should be considered *normal small individuals.* In other words, the genetic background in at least some of them points to the fact that the *normal* type of dwarfs have a genetic history of forebears who were of exceedingly small stature. It might be well



A. *B.*

Fig. 8.—*A*, Dwarf age five years. *B*, Giant age five years. Except for the size of the dwarf hand it compares favorably with a normal hand at birth. The giant of the same chronologic age presents twenty-six ossification centers in excess to the dwarf.

to illustrate by listing one of these cases. The case number of the physical record is 1852 (Table IV); age 17; weight 109 lb.; height 62¼ in.; span 65 in.; long bone measurement 31¼; torso measurement 31; cella (x-ray) negative; orthodontic survey, normal; status of hand bone growth, advanced. Genetic history: father five feet, six inches; mother five feet, one inch; maternal grandfather, five feet, eight inches; maternal grandmother, five feet, four inches.

This adds to the importance of making a detailed analysis of a child presenting itself for orthodontic malformations before a conclusion is reached as to whether the growth anomaly of the jaws and arches is correlated with the growth of the skeleton. Again referring to Table III, it is significant that of the

TABLE IV

CASE NUMBER	AGE	SEX	WEIGHT	HEIGHT	SPAN	LONG BONE	TORSO	CELLA X-RAY	ENDOCRINE IMBALANCE	ORTHODONTIC SURVEY JAW AND ARCH GROWTH	STATUS OF HAND BONE GROWTH—X-RAY
1639	10	F	105	56	57¼	28½	26	x	Hypo-ant. lobe	Class I; narrow arches	Normal for age
1652	12	M	53	46½	48½	23¾	22¾	x	Hypo-ant. lobe	Negative (normal)	Retarded (slight)
1446	12	M	57½	47⅞	50½	23⅞	24	x	Hypo-ant. lobe	Normal	Normal for age
1400	11	M	53½	49	49	26	33	x	Hypo-ant. lobe	Normal	Normal for age
1416	13	F	46	43⅝	43½	21	23	Neg.	Hypo-ant. lobe	Congenitally absent teeth	Very retarded
3025	13	M	59¾	50¾	50½	24¾	26	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded
2389	16	M	77	59	60¾	28¾	30¼	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded
2468	11	M	47	46⅜	45⅝	22⅜	24⅜	Neg.	Hypo-ant. lobe	Normal	Slight retarded
2423	12	M	48	50⅜	x	23¾	26	Neg.	Hypo-ant. lobe	Class I; deep overbite; narrow arches	Slight retarded
2559	9	M	43	45¾	47	21¼	21¼	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded
2398	17	F	75⅛	55¼	55¼	26⅞	28⅜	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded; open ulna and radius
2565	11	F	50½	49½	51¾	24½	25	Neg.	Hypo-ant. lobe	Normal	Normal
2609	13	F	51¾	50⅞	x	25⅝	25½	Neg.	Hypo-ant. lobe	Class I; narrow arches	Small (retarded)
2598	14	F	66½	52⅛	53	26⅜	25¾	Neg.	Hypo-ant. lobe	Class I; deep overbite; narrow arches	Retarded
2661	11	M	40½	48¾	49½	28¾	25	Neg.	Hypo-ant. lobe	Class II; Div. 2	x x x x
2652	5	F	28	32	30½	12¼	19¾	Neg.?	Hypo-ant. lobe cretinism	Class I; narrow arches	Very retarded
2647	8	F	49	50	50¾	24	26	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded (slight)
2736	15	M	56¾	50⅜	52	26	24	?	Hypo-ant. lobe	Class I; narrow arches	Very retarded
2762	14	M	66	54	55¾	26¾	27¼	Neg.	Hypo-ant. lobe	Class I; narrow arches	Very retarded
2717	10	M	48	49¼	51	25¼	24	Neg.	Hypo-ant. lobe	Class I	Negative
2132	13	M	75	55¼	x	28	27¼	Neg.	Hypo-ant. lobe	Class I ?	Retarded
2162	12	M	62	52¾	54½	27¼	25¼	Neg.	Hypo-ant. lobe	Narrow arches; Class II; Div. 1	Retarded
2197	12	M	70	51¾	52½	25½	26¼	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded
2189	12	M	69	52¼	55¼	25¾	26½	Neg.	Hypo-ant. lobe	Class I ?	Retarded
2221	9	M	56½	51⅛	51¼	25⅜	25¾	Neg.	Hypo-ant. lobe	Class II; narrow arches	Negative
2219	10	F	48	43⅜	44⅛	23⅝	24¾	Neg.	Hypo-ant. lobe	Normal	Normal
1852	17	M	109	62¼	65	31¼	31	Neg.	Hypo-ant. lobe	Normal	Advanced
1927	14	M	90	55½	54¾	x	x	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded (slight)
2781	10	M	60	52⅜	51½	25⅞	26½	Neg.	Hypo-ant. lobe	Narrow arches; Class I; open-bite protrusion	Retarded

TABLE IV—CONT'D

2780	12	F	57½	53⅛	53¾	27⅛	26	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded
3035	8	M	40	43½	44¼	21¼	22¼	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded
2960	16	M	84	58¾	59¼	29¼	29½	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded
2977	5	F	33½	38¾	38¾	18¼	20½	Neg.	Hypo-ant. lobe	Narrow arches; Class I; open-bite	Very retarded
2875	7	M	35¾	39½	40⅜	x	x	Neg.	Hypo-ant. lobe	Narrow arches; Class II; Div. 1	Very retarded
2878	15	M	52	49¾	48½	24⅜	25⅜	Neg.	Hypo-ant. lobe	Class I; narrow arches	Very retarded
2888	12	M	46½	47¼	48¼	22½	24¾	Neg.	Hypo-ant. lobe	Class I; narrow arches	Retarded
2868	14½	M	65¾	54¾	55¾	28	26¾	Neg.	Hypo-ant. lobe	Class I ?	Retarded
3007	5	M	44¾	43½	44½	19¾	23¾	Neg.	Hypo-ant. lobe	Class II; narrow arches	Retarded
3041	14	M	78	55¾	59¼	27	28	Neg.	Hypo-ant. lobe	Normal	Normal

The Medical Staff of the Good Samaritan Clinic diagnosed all above cases as retarded skeletal growth due to the hypo secretion of the growth hormone of the anterior lobe of the pituitary body.

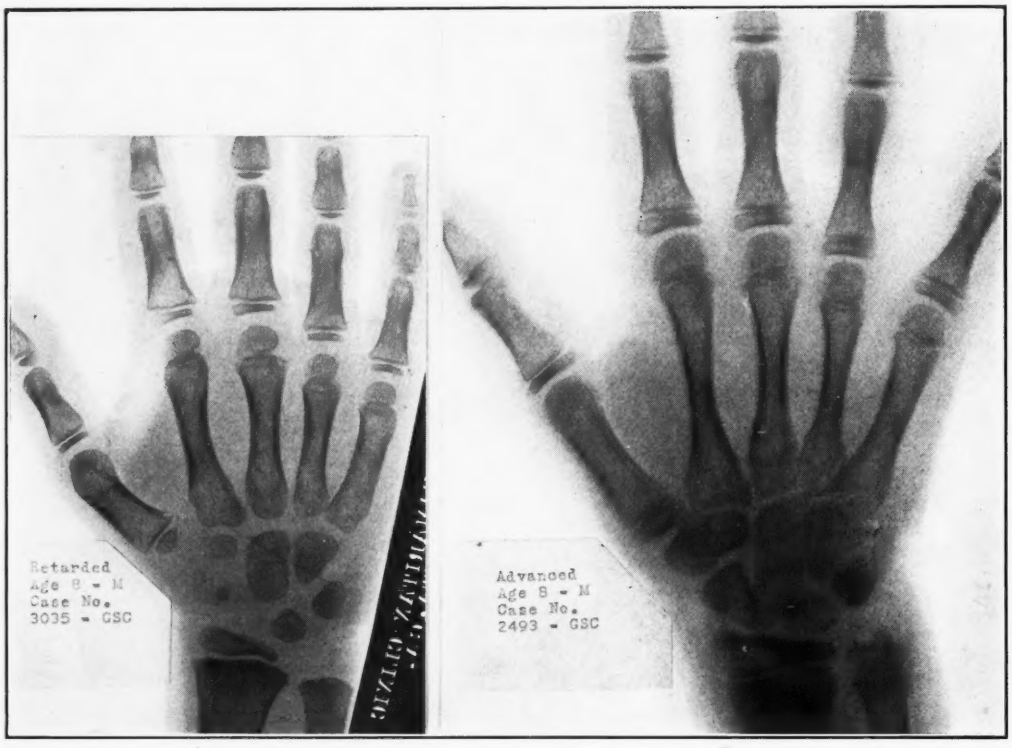
Neg.=Negative.

Hypo-ant. lobe=Hypo secretion of the anterior lobe of the pituitary gland.

thirty-nine individuals diagnosed as being retarded in skeletal growth, there are twenty cases presenting deficiency in arch width. The hand bone growth of nineteen of these twenty cases is diagnosed as retarded.

ACCELERATED HAND BONES COMPARED TO RETARDED HAND BONES (X-RAYS)

The group of x-ray hand pictures, Figs. 8-17, demonstrates an excellent value toward arriving at a diagnosis of jaw and arch growth problems. Attention is particularly invited to the details of the data accompanying the advanced growth cases (see Table II) and the retarded growth cases (see Table IV).



A. *B.*

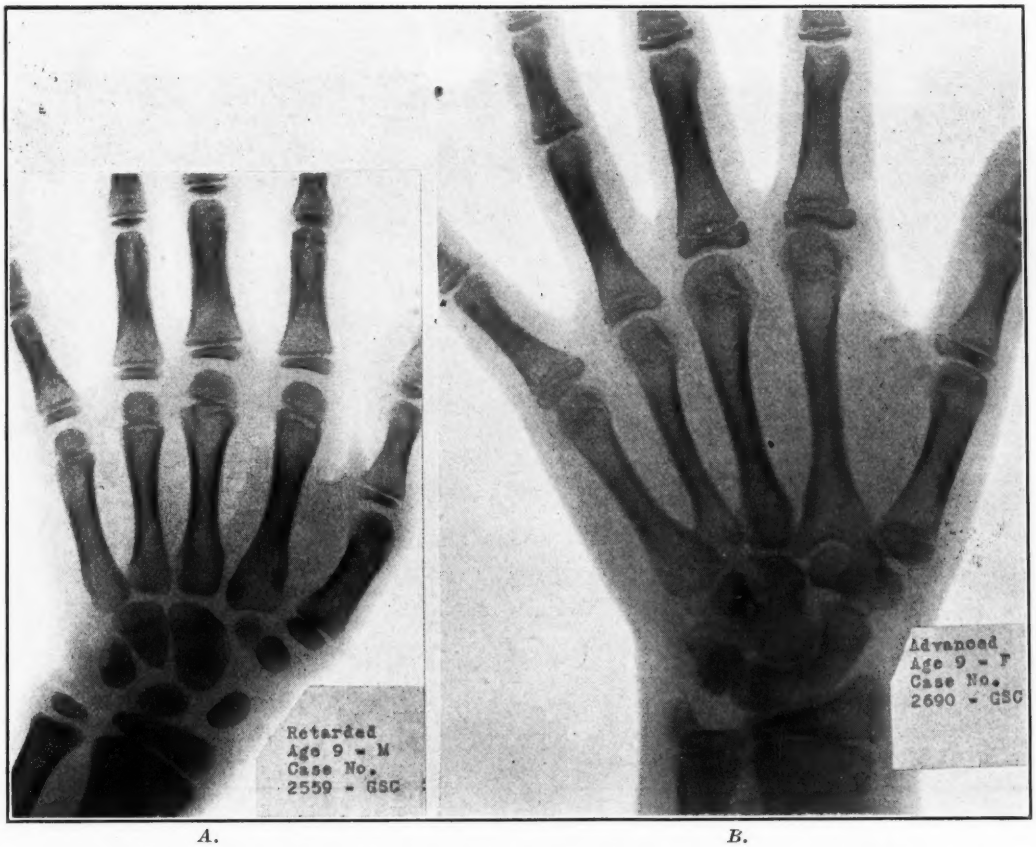
Fig. 9.—*A*, Dwarf age eight years. *B*, Giant age eight years. By comparing the bone organization of the dwarf hand with that of the giant, it is noted that in the dwarf only six carpals are present with a total absence of the epiphysis of the ulna. The giant hand shows a definite shadow of the pisiform carpal bone with a well-developed styloid process of the ulna. Normally the pisiform should not appear before about thirteen years of age for the male.

Notice how closely dwarfism correlates with the size of the hand, as well as the size of the dental arches. Equally is this true in gigantism.

CONCLUSIONS

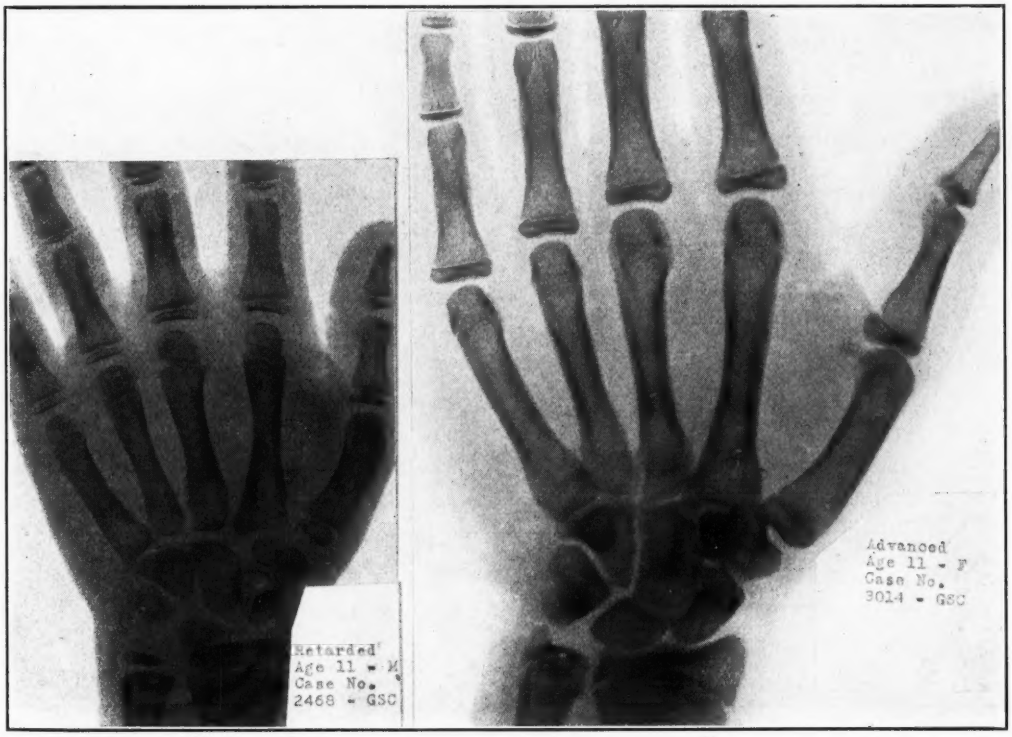
Class III *growth* problems are in fact an expression of a phase of acromegaly. The term "acromegaloid" more nearly describes the clinical picture.

Our present hypotheses of etiology are untenable in explaining perverted growth of the jaws and dental arches. Evidence as to their validity has never been recorded.



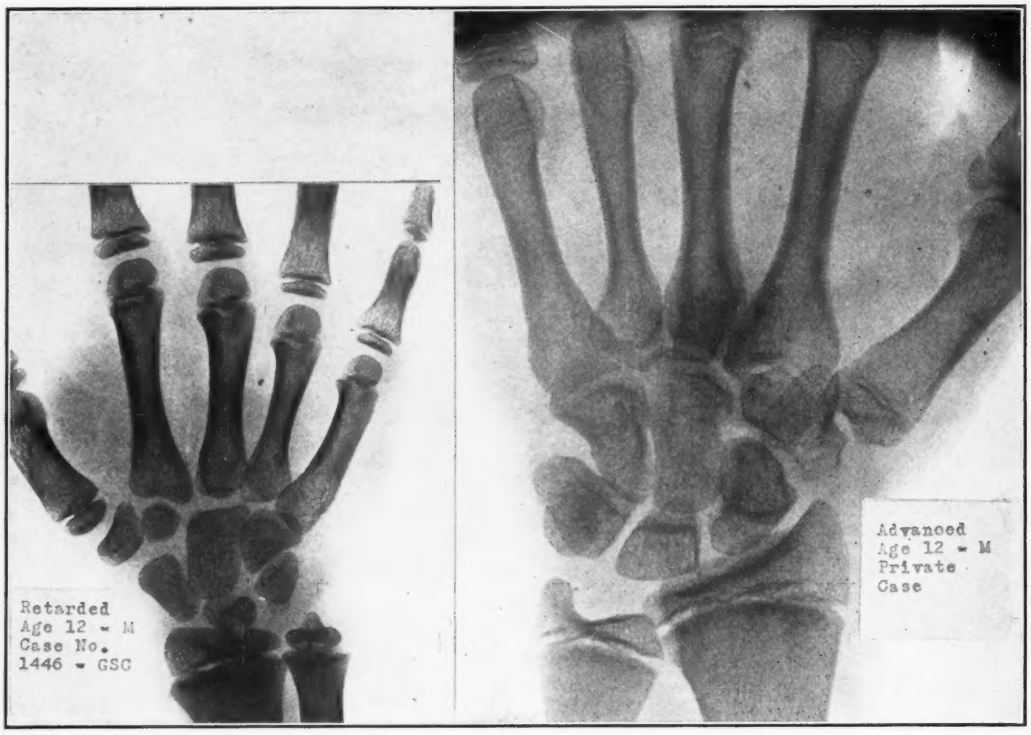
A. *B.*

Fig. 10.—*A*, Dwarf age nine years. *B*, Giant age nine years. Quantitatively, bone organization in the hand of the giant is decidedly in advance to that of the dwarf. Particularly note by comparison the styloid processes, the pisiform and the sesamoid for this chronologic age.



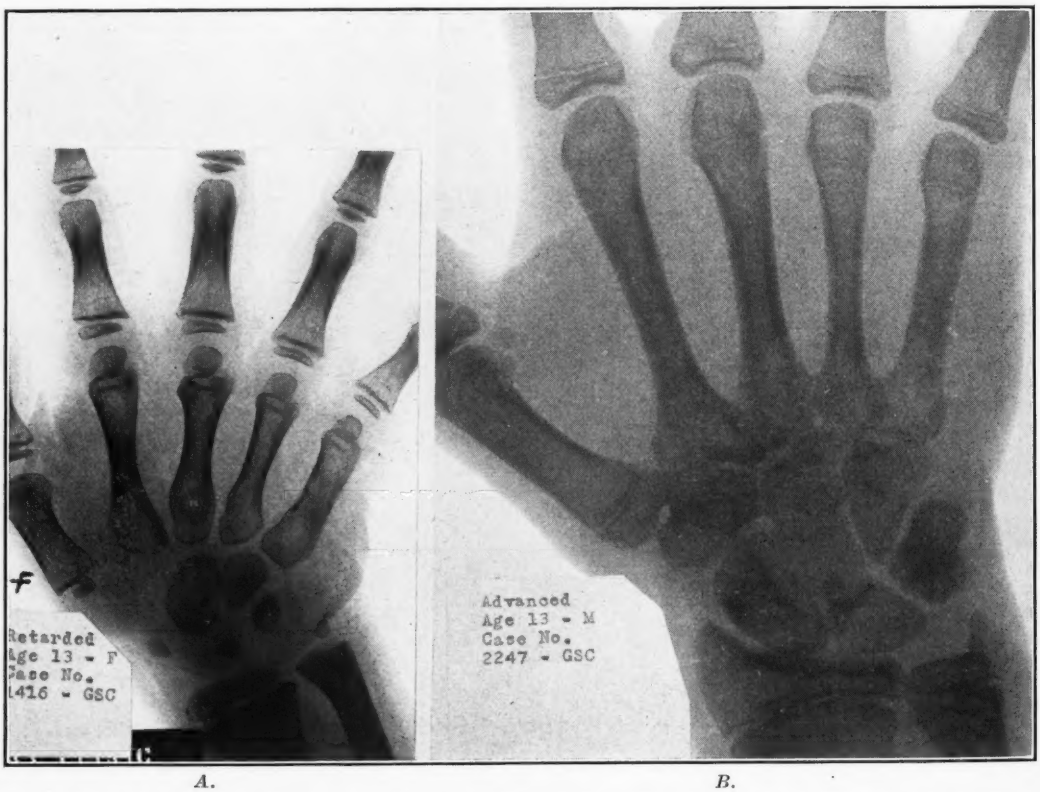
A. *B.*

Fig. 11.—*A*, Dwarf age eleven years. *B*, Giant age eleven years. Practically the same contrast as shown in Fig. 9.



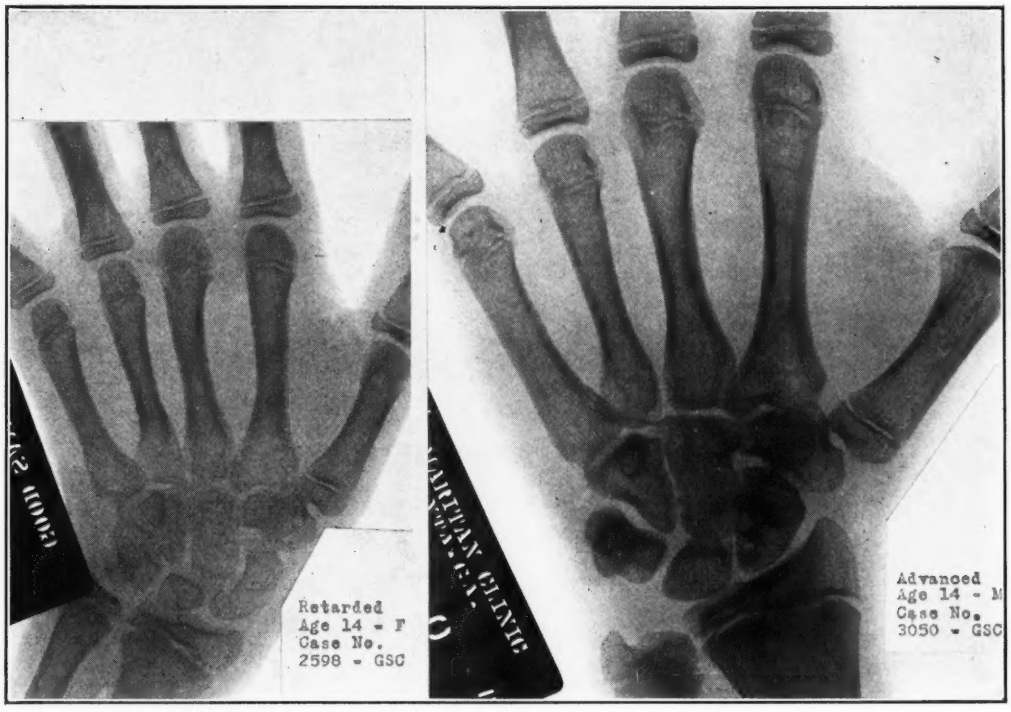
A. *B.*

Fig. 12.—*A*, Dwarf age twelve years. *B*, Giant age twelve years. The comparative difference is too striking to invite comment.



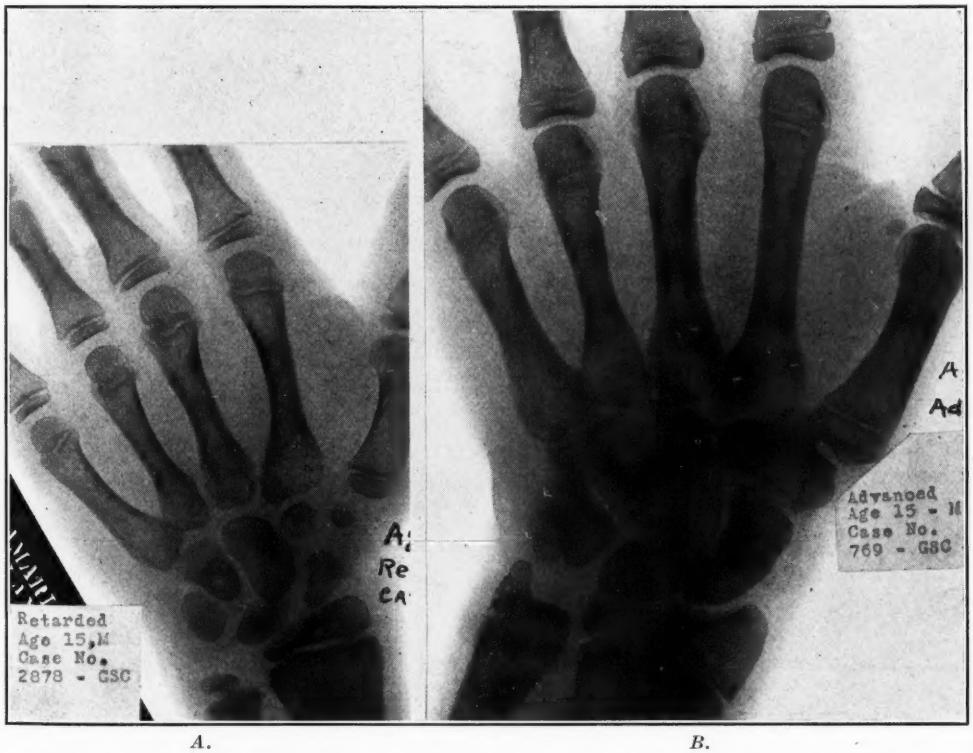
A. *B.*

Fig. 13.—*A*, Dwarf age thirteen years. *B*, Giant age thirteen years. The normal physiologic bone organization of the female is about one and one-half years in advance of the male at age thirteen. Compare the dwarf hand with the giant hand.



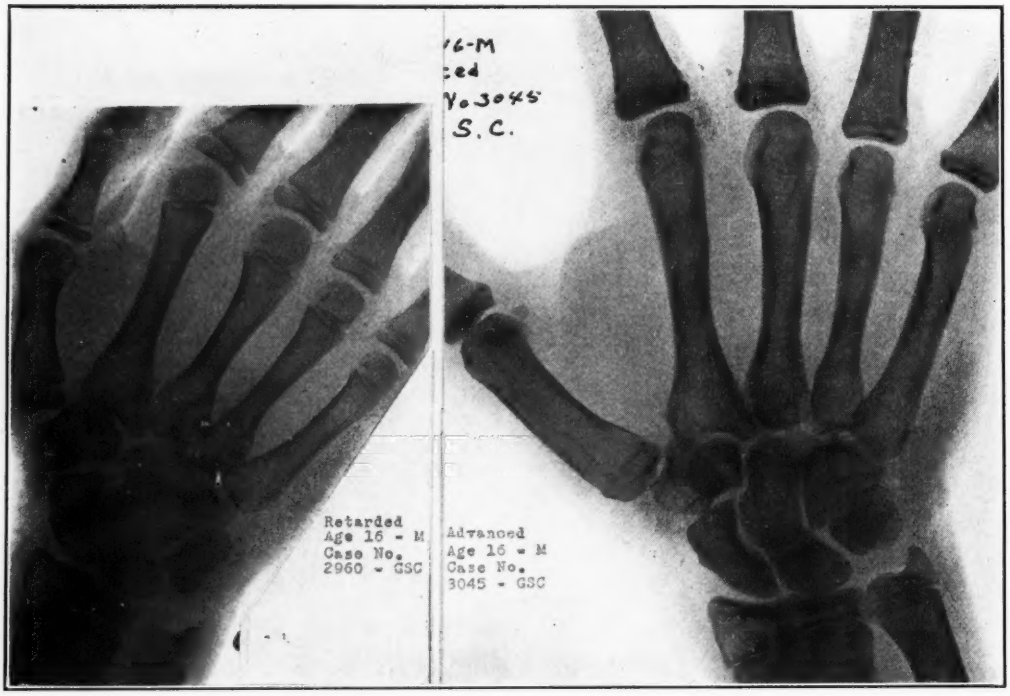
A. *B.*

Fig. 14.—*A*, Dwarf age fourteen years. *B*, Giant age fourteen years. This is an interesting comparison from a *qualitative* standpoint. Note the similarity of density occurring in the carpals and the epiphyses of the metacarpals. The giant is quantitatively in advance of the dwarf, but qualitatively they are almost identical.



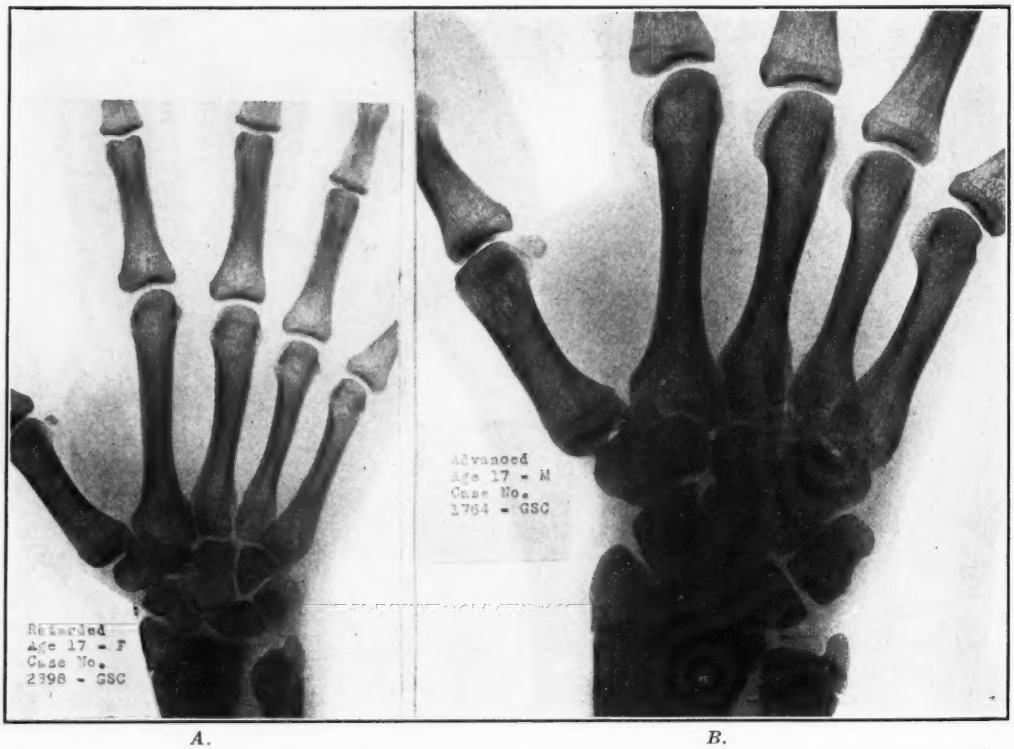
A. *B.*

Fig. 15.—*A*, Dwarf age fifteen years. *B*, Giant age fifteen years. Note *contrast* both quantitatively and qualitatively. Furthermore in the dwarf, ossification has not appeared in the sesamoid, the pisiform or the styloid processes of the ulna and radius.



A. *B.*

Fig. 16.—*A*, Dwarf age sixteen years. *B*, Giant age sixteen years. Compare the width of the diastases in the dwarf to that of the giant.



A. *B.*

Fig. 17.—*A*, Dwarf age seventeen years. *B*, Giant age seventeen years. Bone organization presenting an almost purely quantitative contrast.

Our services, as far as their greatest value is concerned, invite as a fundamental background to orthodontic training a serious study of all that is known in biology as it relates to growth. During the first quarter of this century

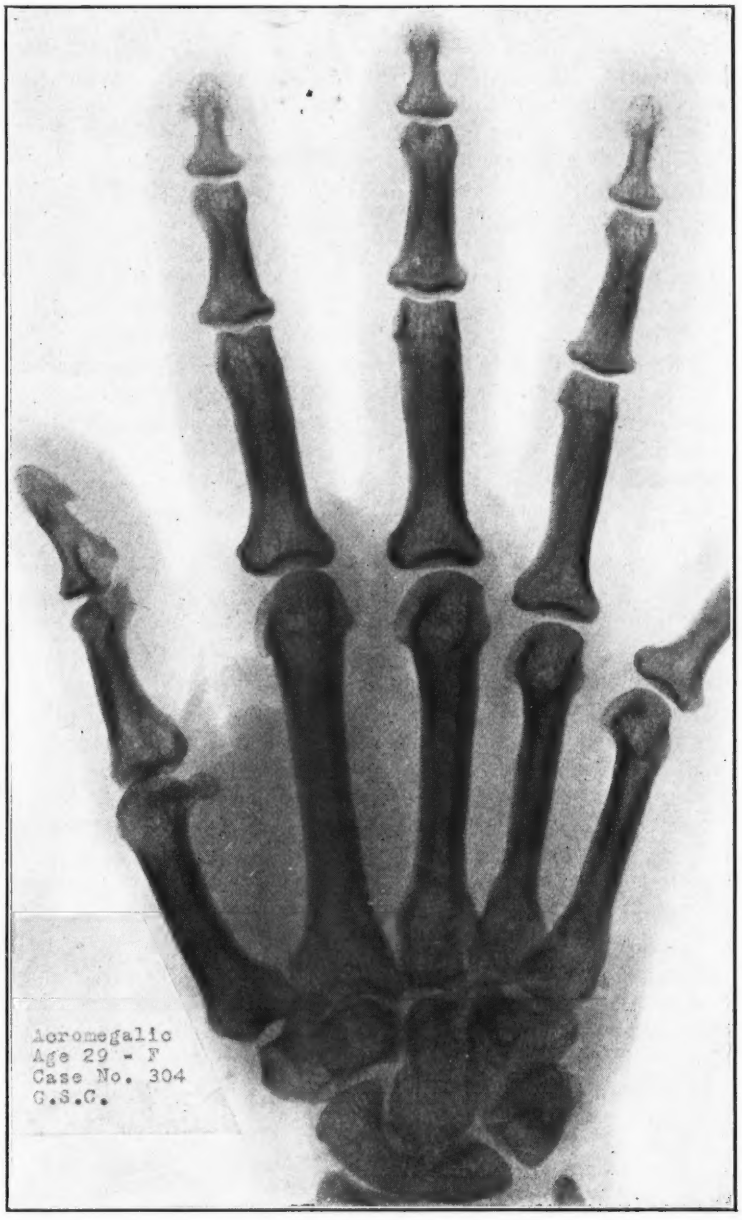


Fig. 18.—Hand of an advanced acromegalic, age 29, female. Note marked tufting of distal ends of all first phalanges.

three thousand five hundred articles and books were written upon the subject of growth.

X-ray studies of the bones of the hand are indispensable in the analysis of growth perversions.

1105 Doctors Bldg.

REFERENCES

1. Howard, Clinton C.: J. A. D. A. **19**: 642, 1932.
2. Idem: A Phase of Skeletal Growth as Influenced by the Sex Hormones, INTERNAT. J. ORTH. **18**: 659, 1932.

DISCUSSION

Dr. Daniel L. Sexton, St. Louis.—It was my privilege to read Dr. Howard's papers before coming to this meeting, and it was astonishing to learn the amount of painstaking work he has done. I am grateful to him for a concise and clear correlation between statural growth and orthodontic development and occlusion.

I do not profess to know anything about the mechanism of malocclusion, but in the course of examining endocrine cases there are some things that stand out which one cannot fail to observe. Notably among these is the constancy of malocclusion in children with endocrine dysfunction, particularly pituitary disorders.

There are one or two points brought out by Dr. Howard in relation to osseous development and osseous fusion that I would like to stress. Osseous development in children up to the age of seven years can be studied with considerable accuracy by observing the bones in the wrist. A good rule to remember is that there is one ossified carpal center for each year of life until the age of seven and that any marked variation from this finding is abnormal. Beyond the age of seven years it is necessary to study other skeletal parts, and, in order to determine abnormalities at any age during the formative period, it is only necessary to know the time of normal development of the various centers. Charts showing this are easily obtained.

[Illustrative slides were then shown to stress the following points.]

That in true pituitary infantilism both statural and sexual development are lacking. That in such a girl at the age of twenty-six years, as illustrated, the long bones and the epiphyseal centers may not as yet be fused, when normally this occurs in girls between sixteen and eighteen years.

That in pituitary dwarfism in which stature alone is affected and sexual development approaches normal, bone fusion occurs at the normal age, which supports the theory that sexual maturity in some manner brings about fusion of osseous centers with the bone shafts, thereby causing a cessation of growth.

That the contrast in osseous development in the pituitary deficiency type and in the hyperpituitary type is quite evident; it being shown that development and fusion were delayed in the former and advanced in the latter.

That all cases of marked delay in ossification were not deficient in thyroid. The hand of a six-year-old boy which normally should show six well-developed osseous centers was shown to have but two, and it was stated that this boy after one year of thyroid therapy showed no statural or radiographic improvement. Attention was called to the various types of dwarfism and the fact that pituitary dwarfs have normal anthropometric measurements.

Finally, attention was called to the transverse (phosphorus) lines in the distal shafts of long bones which are frequently found in cases of dwarfism. The theory that these lines indicate periods of arrested growth during a febrile illness in early childhood was mentioned.

SOME FEATURES OF THE MANDIBULAR ARTICULATION AS IT PERTAINS TO OTOLARYNGOLOGY*

J. B. COSTEN, M.D., ST. LOUIS, MO.

IT HAS been my interest during the last ten-year period to study and attempt to explain a group of cases presenting various neuralgic phases and impaired hearing, which had failed to respond to the various standard measures of accepted medical treatment. At first, the cases were referred for study as sinus and ear cases. Later, the volume of cases, increasing from 11 cases in eight years to 125 cases in the two succeeding years, may be accounted for by the interest excited in the differential diagnosis between the "mandibular joint syndrome" and the various other similar neuralgic diseases.

The chief function of the jaw being grinding and mastication, it is equipped with the powerful muscles, the masseter, the temporalis, and the pterygoideus internus, all of whose function is to close the jaw. Acting as openers are only the factors of the external pterygoid action, the action of the digastric muscle, and the natural weight of the jaw. By complicated interaction, the jaw is fixed to aid in the act of swallowing, moves to varying extent to accommodate the production of speech, and adapts itself to great variations, as in densities of food, yawning, laughter, and so on. The extent of normal opening of the jaw is controlled by the sphenomandibular ligament, the stylomandibular ligament and the short temporomandibular ligaments making up the capsule of the mandibular joint. These being weak at the forward aspect, extreme looseness sometimes permits the condyle to slide entirely beyond the articular eminence producing subluxation of the jaw. The extent of closure of the jaw is determined by the teeth. Since most of the power of the muscles of mastication is applied to the posterior third of the jaw, most of the impact of chewing is taken by the molar teeth, very little being applied in the incisor district, the mandibular joint acting only as a weak hinge or guide to this movement.

It is not surprising therefore that when molar teeth are missing or the vertical dimension of the jaw is abnormally reduced by shrinkage of the alveolar ridge beneath plates or reduced by grinding away of the natural teeth, the mandibular joint should assume an unaccustomed burden from this district and much of its structure destroyed. When this occurs some of the force is thrown into the incisor region, but most of it is referred upward to the mandibular joint in direct line of the vertical dimension of the jaw. Proper regard for this function is the basis for testing the patient for the mandibular joint syndrome and the basis on which the dentist proceeds to reposition the jaw.

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The study of a large group of these cases exhibiting a pain syndrome and impaired hearing has added various data. Herpes is more certainly one of the irritative phenomena. It appears frequently in the pain group and is almost invariably relieved when the other pain factors are successfully relieved. Salivary disturbance, usually inhibition with excessive dryness of the mouth, is constantly found in the cases with burning tongue.

In general physical examination, abnormal conditions of the eyes, sinuses, circulatory system, nervous system, and the gastrointestinal tract are readily noted; pain from these sources has typical descriptive attributes. Anterior dislocation of the mandibular joint, fracture of the neck of the mandible, or ankylosis of the joint after chronic irritation or infection, require the usual attention as joint problems. This syndrome embracing headache of major importance, neuralgia simulating sinus disease, glossodynia, and deafness, occurs with sufficient frequency to prove its place in diagnosis. A majority of the patients herewith studied are above forty years of age. Each decade of life results in more wear of the natural teeth, or loss of them with the potential chance of destruction of the mandibular joint.

Various or all of the following symptoms were regularly found associated with these cases of malocclusion.

The ear symptoms were: impaired hearing, continuously, or with intervals of improvement; stopping, or "stuffy" sensation in ears, marked about meal time; tinnitus, usually "low buzz" in type, less often, a snapping noise while chewing; pain of prostrating severity; and nystagmus, definitely relieved by inflation of eustachian tubes.

The pain or other symptoms were: headache, severe and constant, localized to vertex and occiput, and behind the ears—typical site of posterior sinus pain, but increasing toward the end of day (atypical sinus history, and suggestive of eye headache); burning sensation in throat, tongue and side of nose; dry mouth with almost total absence of saliva, and rarely, excessive saliva; occasional herpes of the external ear canal and buccal mucosa, most marked on the edentulous side.

The diagnosis of this condition is established by:

1. Maloccluding original teeth, lack of molar teeth on one side or badly fitting dental plates, permitting overclosure.
2. Mild catarrhal deafness, improved at once by inflation of eustachian tubes.
3. Dizzy spells, relieved by inflation of tubes.
4. Tenderness to palpation of mandibular joints.
5. Looseness of condyles within the joint capsule, and weaving of condyles from side to side on opening or closing jaw.
6. Marked comfort to patient from interposing a flat object between the jaws.
7. The presence of the typical headache after sinus or eye involvement has been corrected; presence of the typical headache when sinuses or eyes are found to be negative.
8. History of pain attacks after movement of jaw or chewing tough substance.

The commonest symptom observed was headache or head pain of a type such as enters into so many problems of diagnosis. Sixty-three patients had regular daily headache, more or less severe, forty-nine of whom described the pain as vertex, occipital and about the ears. Twelve had only supraorbital pain. All of these came or were referred for study as sinus cases. Almost all showed more or less sinus infection and had proper treatment. Thirteen volunteered the description of pain as increasing toward the end of day. This was typical of eyestrain headache and no eye lesions were found. The distribution of pain was quite typical of posterior sinus disease.

In a previous report anatomic reasons were advanced for the pain; i.e., (1) erosion of the bone of the glenoid or mandibular fossa, and impaction of the condyles against the thin bone separating them from the dura and its rich nerve supply; (2) irritation by the uncontrolled movement of the condyles backward or mesially, of the auriculotemporal nerve, which passes intimate to the mesial side of the capsule between the condyle and the tympanic plate to distribute over the temporal and vertex region; (3) production of reflex pain and sensory disturbance in the various connections of the chorda tympanic nerve, the condyle irritating it where it emerges from the tympanic plate at the mesial edge of the glenoid fossa through the petrotympanic fissure.

Reasoning from the fact that the mandibular joint capsule is weaker on the mesial side, and the glenoid fossa is protected laterally by the zygoma, it was assumed that in the jaw with unilateral loss of teeth the joint on the unsupported side would suffer most destruction. Observation of the jaw movements of this type of case showed that the patient attempts to occlude the remaining teeth by weaving the jaw laterally toward them. The mandibular teeth slip beyond the maxillary on occlusion, and the condyle on the unsupported side is pulled mesially and upward by the chewing muscles. Exactly the same thing happens when the natural teeth are worn or badly occluding and fail to take the impact of the chewing movement. The joint on the poorly supported side is destroyed. Its condyle slips mesially on closure, impacts the nerve and initiates pain on the same side. Twenty-one cases fall into this group, and the various pains invariably occur on the side in which proper molar support is entirely lost. The joint on the same side is usually quite tender to palpation internally, and functions with a crunch when palpated externally. Ear symptoms, as stopping and deafness, are notably absent in these unilateral neuralgia cases. Each case showing stoppage of the ear or dizziness was at once relieved.

Glossodynia, or burning tongue with or without herpetic lesions, has been described by Butlin, Engman, Dean, Sluder and numerous others, especially in the literature of dermatology. Frequent reference is made to the complaint in cases of pernicious anemia, glossopharyngeal neuralgia and gastric diseases. Dean, and later Sluder, found that some of the patients could be relieved by injection of the nasal ganglion.

Twenty-two patients in this entire series described pain and sensory disturbances about the lateral pharyngeal wall and tongue. In a previous report the emergence of the chorda tympani nerve at the mesial edge of the mandibular fossa was suggested to account for sensory disturbance in the tongue,

when irritated by the loose movement of the condyle mesially. Irritation of the auriculotemporal nerve, as described, may produce pain in the remaining branches of the mandibular nerve, one of the largest of which is the lingual nerve, supplying sensation to the anterior two-thirds of the tongue. The afferent fibers represented by the chorda tympani nerve are actually the sensory part of the facial nerve and end, in part, in the same nucleus as does the ninth or glossopharyngeal nerve. These fibers are considered (Piersol) "as an aberrant strand of the glossopharyngeal." Under other circumstances of study these cases may have been regarded as glossopharyngeal neuralgia; the description of glossopharyngeal neuralgia usually is that it is a paroxysmal pain referred to the region of the fauces and lateral wall of the pharynx, often radiating up to the ear on the affected side; case reports state that the trigger which starts the pain is the act of swallowing. With mouth closed, as in swallowing, the mechanism for irritating both the chorda tympani and the auriculotemporal nerves by the condyle is ideal and likely. The evidence is more and more convincing that malocclusion and destruction of the mandibular joint are important in the etiology of glossopharyngeal neuralgia. It is at least quite clear from eighteen cases of burning tongue completely relieved by repositioning the jaw, that this is the principal etiologic factor of glossodynia of peripheral nerve origin.

One patient complaining of a copper and salt taste along the left border of the tongue for a period of four months was tested by wearing a cork pack 1 mm. thick within the left molar spaces for forty-eight hours. She was completely relieved and considered as an example of irritation of the left chorda tympani. She was sent to the dentist but refused to have a denture because she considered the condition entirely cured!

Although herpes has long been established as a toxic disease of the ganglia of the posterior nerve roots, associated with a vesicular inflammation of the skin of the corresponding areas, a mild type is found associated with these cases, not occurring in the presence of acute infections. There were twenty-one in the series, all in the pain group, who described vesicular eruption about the external canals, the corners of the mouth, the hard palate or the buccal mucosa. Fifteen of these were relieved along with the other complaints, in the cases followed up. Hunt has pointed out a characteristic symptom complex, of deep seated pain in the ear and mastoid, herpes of the auricle, external auditory canal, and tonsillar region and facial paralysis, in connection with inflammation of the geniculate ganglion. He described certain cases with herpetic lesions about the external auditory canal, and with pain symptoms, but without facial palsy. He classes these as of the type of zoster of the auricle, long before termed idiopathic; these were accounted for by earlier observers favoring the neuritic theory of herpes zoster, by ascribing the skin lesions on the auricle to a neuritis of the auriculotemporal branch of the fifth nerve. The favorable reaction of the herpes group of this series to repositioning of the jaw is proof that their source is pressure irritation of the auriculotemporal and chorda tympani nerves by uncontrolled movements of the

condyle, and transmitted to the ganglia. It would explain the idiopathic group referred to in Hunt's series, as well as the twenty-one cases referred to above.

X-ray study, plating the joint on closure, shows the condyle impacted upward and backward, but so far cannot demonstrate the position of the condyle shoved mesially. Erosion of the head of the condyle and articular eminence may be seen. Fibrosis of parts of the joint involved is readily noted as well as wide excursion of the condyle forward when it is greatly loosened. These findings correspond nicely with the pathologic studies of the joint by Axhausen, Dufourmentel, and Steinhardt.

A few of the neuralgia patients complained of tinnitus of a mild grade, but the majority of the ear symptoms seem to be referable to simple overbite or overclosure of the jaw. Forty-two of the series presented ear symptoms. Thirty-two of these were edentulous, or had natural teeth allowing wide overbite. The majority of the forty-two ear cases had headache in addition to deafness, tinnitus, or dizziness. So it would seem that headache and the pain effects appear more common by a large majority than ear involvement.

The ear involvement was usually found to be mild, and the result of compression of the eustachian tubes; dizziness disappeared with the inflation of the eustachian tubes, and this was considered an important test in the diagnosis. Deductions as to the behavior of the tissues bordering the tube during overclosure of the jaw were made by experimental overclosure of the jaw of a soft tissue specimen. When this is done manually (to imitate similar overclosure in life), the tensor veli palatini muscle bordering the membranous anterior edge of the tube, and the adjacent sphenomeniscus muscle, are seen to wrinkle, and crowd the eustachian tube, closing it firmly. During the act of swallowing the tensor palatini muscle should be tensed, and effect a temporary opening of the tube. This function cannot occur during overclosure, and the result is derangement of intratympanic pressure, and dizziness. Continued production of the tube effects brings about a catarrhal or adhesive deafness exactly as produced by inflammation or pressure from the nasopharynx. The catarrhal deafness improves more or less after repositioning the jaw. The grade of improvement seems to depend simply upon the degree of structural involvement. Follow-up has been possible in only the earlier of this large group, but a tabulation of sixteen cases of dizziness showed twelve of them improved in hearing and relieved of dizziness.

SUMMARY

Review of a large group of cases in which headache and ear symptoms were shown to be partially or altogether due to disturbed function of the mandibular joint, suggests the frequency of this factor. The descriptions of pain and ear involvement are similar in every respect to some commonly known eye, sinus and ear disorders.

Eighty-five cases fall into the pain group, and these include the ones with burning and sensory disturbance about the tongue and pharynx.

Only since the return of saliva in the tenth of the group with glossodynia, has this point been obtained in the histories. There are twenty-two cases of

glossodynia to date, and among the last twelve, four patients have described constant dryness of the mouth. In each the saliva has returned abundantly during the test treatment. Another in the glossodynia group, with unbearable pain, had excessive saliva, which became normal after relief of pain. Another, not in the painful class, had been diagnosed parotid tumor for twenty-three years. The gland remained enlarged and hard regularly, and at intervals softened, with discharge of a large amount of saliva into the mouth. Increase of vertical dimension of the jaw 3 mm. on the affected side in this case was followed by return of the gland to normal in four months. These various phenomena may be accounted for by records of some earlier experimentation as follows: Heidenhain showed (1878) that stimulation by weak induction shocks of the chorda tympani in dogs caused the submaxillary and sublingual glands to secrete promptly. Further experiment showed that stimulation of sympathetic as well as parasympathetic fibers augments salivary secretion, especially if done simultaneously. However, Czermak (1857) had shown that sympathetic stimulation with strong stimulus to the chorda tympani inhibited with the secretory activity of the submaxillary, and Mislawsky and Smirnow (1893) observed a similar inhibitory effect on the parotid gland by stimulation of the auriculotemporal nerve. A direct parallel seems to be shown between the above classic experiments and the clinical cases reported herewith.

Thirty-five cases had varying grades of catarrhal deafness, due either to compression from overclosure or to chronic nasal infection. Four of the ear cases had shortened bone conduction and were not improved by repositioning the jaw; these may be regarded either as VIII nerve deafness, or as examples of microfractures of regions near the otic capsule interfering with transmission of sound waves to the inner ear, as observed by Guild. The dizziness is not typical of toxic labyrinthitis.

Analysis indicates that ear symptoms predominate in edentulous mouths whose symptoms develop slowly; this is the pressure effect on eustachian tubes as explained; and that pain symptoms, with or without herpes of the external canal and buccal mucosa, predominate in the cases of natural malocclusion or malocclusion from loss of molar support on one side only.

The correction of the jaws and replacement of dentures were done by various dentists, within the patients' acquaintance. The results were generally good except in the few cases of malocclusion of natural teeth presenting great difficulty. It was noted, however, that the cases showing the best results were corrected in several stages, slowly increasing the vertical dimension of the jaw. The prognosis in a given case depends on these factors: (a) the accuracy with which refitted dentures relieve abnormal pressure on the joint, the increase of vertical dimension keeping the moving condyles out of range of dura, chorda tympani and auriculotemporal nerves; (b) the extent of injury to the tube and to the condyle, the meniscus and the joint capsule.

Twenty-six patients of the series showed mild herpes of the buccal mucosa, angle of the mouth and external ear canal, all preceded by pain and improving with the disappearance of the other symptoms. Some form of herpes occurs in 20 per cent of mandibular joint cases.

The complete relief of eighteen cases of burning tongue is important evidence that the cases of glossodynia without local lesion on the tongue and pharynx are due to irritation from the uncontrolled movement of the condyle.

Approximate testing to prove the presence or absence of these factors is done by the use of 2 mm. cork discs, which are placed within the patient's jaw for a short test at the time of the examination, and when not conclusive the patient is given the discs and instructed to carry them within the jaws for a few days, several hours a day. Changes in the nature of the symptoms are reported on his return.

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DISCUSSION

Dr. Sidney E. Riesner, New York.—I am very grateful for the opportunity of having been present to listen to Dr. Coston's presentation. I have followed him rather keenly in his earlier presentations in the literature, and I am happy to make this personal contact.

Naturally, he emphasizes something which, when it was presented before the orthodontic body last year at the meeting in New York, we tried to correlate and translate in its application to orthodontia. We can very well see, as was beautifully illustrated in his presentation, just how important a condition this presents for our consideration in establishing the normal and correct relationship of the joint, not only from the standpoint of occlusal relationships, but perhaps the more important one of the physical comfort of the patient.

Dr. Costen's presentation is from the medical viewpoint, and its therapy naturally includes something that can raise the bite in cases in which there has been loss of vertical diameter through mutilation. Our particular problem is one that is concerned with loss of vertical diameter through lack of growth development or some anomaly in development, but for whatever reason, the same problem presents when we do not have correct vertical relationship; there is that same close superior placement of the condylar head in the fossa, which will produce the symptoms he describes.

In his reference to the deposition of salts in the joint, as illustrated by the beautiful reproduction of Dr. Steinhardt, I think perhaps the translation was misunderstood. Steinhardt's translation mentions that the deposit of salts occurs only in what is equivalent to the epiphyseal closure of the joint by a calcium deposit, and is not a deposition of lime as a result of excessive stimulation, but practically only as the final combination in the developmental process of epiphyseal closure of the joint.

FORM AND DIMENSIONS OF THE PALATE DURING THE FIRST YEAR OF LIFE

HARRY BAKWIN, M.D., AND RUTH MORRIS BAKWIN, M.D., NEW YORK, N. Y.

THERE is little accurate information regarding the form and dimensions of the palate during infancy. In 1900 Alkan[1] reported measurements in vivo of the palates of 35 newborn infants. He measured the palatal width "at about the midpoint of the alveolar arch," the palatal height, and the palatal length. His results differ significantly from those of later workers. Denzer,[2] in 1921, studied the growth of the palate in 38 infants under one year. Casts were made from wax impressions in the manner ordinarily employed, and measurements of the casts were then made with the apparatus devised by Stanton.[3] Only maximum width and height were measured.

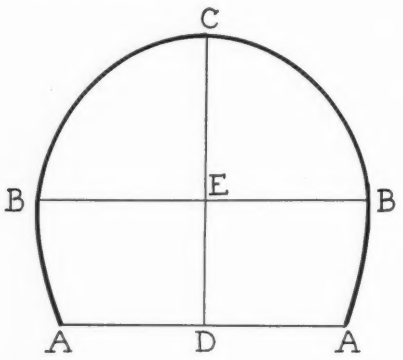

Fig. 1.—Dimensions measured:
1. Maximum palatal breadth (B-B).
2. Posterior palatal breadth: The diameter between both postgingivae (A-A).
3. Maximum palatal length: From the incisivum to the posterior breadth chord (C-D).
4. Anterior palatal length: From the incisivum to the maximum palatal breadth chord (C-E).
5. Maximum palatal height: Maximum height above the surface of the gingivae.

From dental casts Peyton[4] measured the palates of 91 normal infants under one year. He made measurements of the widest transverse diameter, the surface width, the height, and the chord of the alveolar process. From his data he constructed curves of central tendency for the various palatal dimensions in relation to crown-heel length.

Ashley-Montagu[5] measured casts made by us from the palates of 90 male newborn infants. His measurements are included in the tables and figures.

As part of a study of body build in infants, palatal impressions were made in 428 infants under one year, of whom 305 were males and 123 females. Dental

From the Children's Medical Service of Bellevue Hospital and the Department of Pediatrics, New York University Medical College.

trays were made from a soft, malleable material. The trays were cut into various sizes and shapes and fitted to the infants' mouths. Impressions were made in wax and from these casts were prepared. Height of the palate was measured with the apparatus devised by Stanton[3] to whom we wish to express our ap-

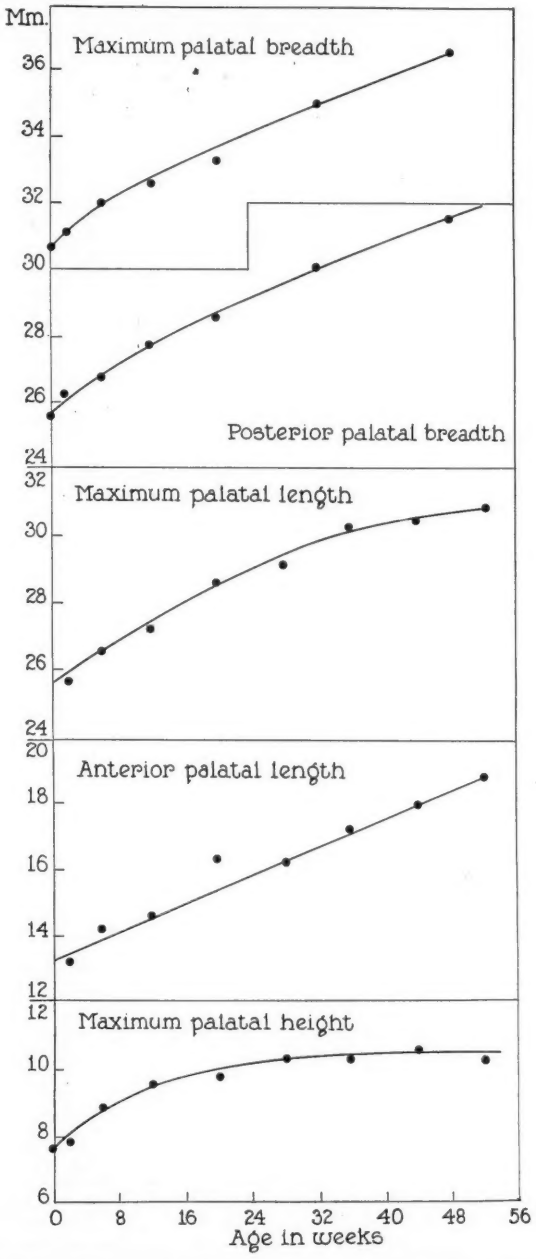

Fig. 2.—Growth of certain dimensions of the male palate during the first year of life.

preciation for permitting its use. Other dimensions were measured with calipers. The dimensions measured are illustrated in Fig. 1.

The infants used in this study were from the vicinity of Bellevue Hospital. Only infants of Caucasian stock are included. Most of the infants either were

TABLE I

DIMENSIONS OF THE PALATE BY SEX AND BY CERTAIN SUBDIVISIONS OF AGE UNDER ONE YEAR

AGE WEEKS	NUMBER OF CASES	BODY WEIGHT	L_1 MAXIMUM PALATAL LENGTH		L_2 ANTERIOR PALATAL LENGTH		B_1 POSTERIOR PALATAL BREADTH		B_2 MAXIMAL PALATAL BREADTH		H MAXIMAL PALATAL HEIGHT		PALATAL INDICES		
													$B_2 \times 100$	$L_2 \times 100$	$H \times 100$
		KG.	MEAN MM.	ST. D. MM.	MEAN MM.	ST. D. MM.	MEAN MM.	ST. D. MM.	MEAN MM.	ST. D. MM.	MEAN MM.	ST. D. MM.	L_1 MEAN	L_1 MEAN	L_1 MEAN
Males															
Birth	89	3.32	25.6	1.60			25.5	1.20	30.6	1.50	7.6	2.00	119.5	55.6	24.8
0- 3	42	3.32	25.6	1.65	13.2	1.34	26.2	1.53	31.1	1.75	7.8	1.72	121.0	51.4	25.0
4- 7	28	3.45	26.5	2.04	14.2	1.52	26.7	1.80	32.0	2.46	8.8	1.09	120.5	53.6	27.8
8-15	36	4.28	27.2	2.28	14.6	1.82	27.7	2.36	32.6	2.68	9.5	1.24	119.7	53.6	29.2
16-23	31	5.49	28.5	2.18	16.3	2.12	28.5	2.06	33.3	2.44	9.7	0.92	116.6	57.4	29.2
24-31	36	6.29	29.1	2.08	16.2	2.48	30.2	2.12	35.4	2.50	10.3	1.03	121.9	55.7	29.2
32-39	17	7.53	30.2	2.27	17.2	2.56	29.7	1.80	34.5	2.50	10.3	1.12	115.2	57.0	30.0
40-47	13	8.04	30.4	2.02	17.9	1.73	32.1	2.06	36.8	2.65	10.5	1.13	121.2	59.0	28.6
48-55	12	–	30.8	2.24	18.7	2.82	30.8	1.54	36.3	2.50	10.2	1.38	117.8	60.5	28.7
14-20 mo. (Mean 16.6)	11	–	32.5	–	19.4	–	31.5	–	35.5	–	10.5				
Females															
0- 3	22	3.25	25.8	1.51	13.8	1.17	26.1	1.46	30.5	1.73	8.1	1.12	118.0	53.5	26.6
4- 7	16	3.33	25.8	1.82	13.4	1.20	26.1	1.46	30.5	1.58	8.3	0.85	118.0	52.0	27.2
8-15	26	3.72	26.6	2.28	14.0	1.63	26.4	1.50	30.5	2.04	9.0	1.15	115.0	52.6	29.6
16-23	20	4.54	26.8	2.75	14.3	1.70	27.4	1.88	31.4	1.91	9.3	1.09	117.5	53.4	29.6
24-31	10	6.20	28.5	1.69	16.5	2.02	28.1	1.70	33.6	2.16	9.6	1.01	118.0	57.9	28.6
32-39	17	6.70	29.7	2.02	17.4	1.88	29.2	1.78	34.1	2.17	9.2	0.96	115.0	58.6	27.0
40-47	8	–	30.9	–	18.1	–	28.8	–	33.9	–	10.4	–	110.0	58.5	30.6
48-55	4	–	30.3	–	20.0	–	28.5	–	34.5	–	10.0	–	114.0	65.8	29.0

St. D. = Standard deviation.

TABLE II

DIMENSIONS OF THE MALE PALATE AT BIRTH, SIX MONTHS, AND ONE YEAR
(INTERPOLATED VALUES FROM FIG. 2)

AGE	L_1 MAXIMUM PALATAL LENGTH		L_2 ANTERIOR PALATAL LENGTH		B_1 POSTERIOR PALATAL BREADTH		B_2 MAXIMUM PALATAL BREADTH		H MAXIMUM PALATAL HEIGHT		PALATAL INDICES		
											$B_2 \times 100$ / L_1	$L_2 \times 100$ / L_1	$H \times 100$ / B_2
	MEAN	ST. D.	MEAN	ST. D.	MEAN	ST. D.	MEAN	ST. D.	MEAN	ST. D.	MEAN	MEAN	MEAN
Birth	25.6	1.8	13.3	1.0	25.7	1.3	30.6	1.8	7.4	2.0	119	51.8	24.2
6 months	29.1	2.3	16.0	2.4	29.2	2.0	34.2	2.5	10.1	1.1	118	55.0	29.6
1 year	30.8	2.2	18.7	2.8	31.9	3.1	37.0	2.2	10.4	1.2	120	60.7	28.1

St. D. = Standard deviation.

healthy or were suffering from minor upper respiratory infections. Infants in the Bellevue district are somewhat under weight and height as compared with infants from a better economic environment. Infants with rickets, syphilis, or other disease which might affect palatal shape are excluded.

Means and standard deviations for the palatal dimensions, the palatal indices and the body weight at certain subdivisions of age under one year are shown separately by sex in Table I. Palatal dimensions on a small number of children during the second year of life are included. The growth of the palatal dimensions in male infants is illustrated in Fig. 2; and Table II shows palatal values at birth, six months, and one year, interpolated from the curves. The maximum breadth and length of the palate grow at about the same rate, the breadth-length index remaining unchanged during the first year. The palatal height, however, grows more rapidly than breadth, the palate becoming both absolutely and relatively higher. The posterior palatal breadth retains the same relation to length throughout the first year. The anterior palatal length becomes relatively longer, indicating that the point of maximum palatal breadth moves posteriorly during the first year.

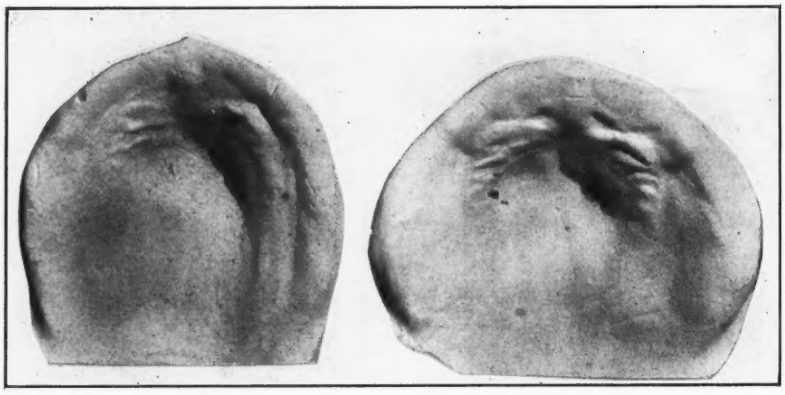

Fig. 3.—Palates of two male newborn infants showing wide variability in palatal form.

As has been pointed out by numerous observers, the outlines of the tooth sacs are present at birth and even during early fetal life.[6] The middle incisor and canine markings are particularly striking. The gum markings are usually rounded, occasionally sharp. Transverse ridges radiating from the central raphe are usually visible in the anterior portion of the palate.

The palatal dimensions vary widely during the first year, about 7 per cent* for the two breadth dimensions and for the maximum length dimension. The anterior palate length is even more variable, owing in part to the difficulty of delimiting this dimension posteriorly. The maximum height shows a 10 to 12 per cent variability.* An estimate of the wide variability of the palate can be gained from inspection of the palates of two male newborn infants shown in Fig. 3.

In Table III the correlation between the maximum breadth and length of the palate in 100 male newborn infants is shown, as well as the correlation of

*Percentage variability here means the coefficient of variation, i.e., the standard deviation, divided by the mean, times 100.

these dimensions with various body dimensions. The correlation coefficients are of low order as are the coefficients between other external dimensions in the newborn.[7]

TABLE III

CORRELATION OF THE MAXIMUM BREADTH AND LENGTH OF THE PALATE AND CERTAIN EXTERNAL BODY DIMENSIONS IN 100 MALE NEWBORN INFANTS

	MAXIMUM BREADTH OF PALATE	MAXIMUM LENGTH OF PALATE
Maximum length of palate		
Body weight	0.56	0.47
Total body length	0.47	0.37
Sitting height	0.45	0.41
Biacromial diameter	0.44	0.24
Biiliac diameter	0.23	0.26
Cephalic length	0.53	0.46
Cephalic breadth	0.55	0.50
Bimalar diameter of face	0.50	0.40
Upper facial height (nasion-prosthion)	0.33	0.18
Height of mandible (infradentale menton)	0.15	0.11
Inter-inner canthus diameter	0.37	0.18
Breadth of nose	0.30	0.33
Height of nose	0.25	0.20

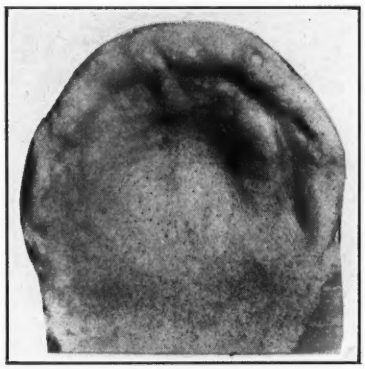

Fig. 4.—Palatal asymmetry in a male newborn infant with marked asymmetry of the head.

Sex.—The palatal dimensions in the male are, on the average, larger than those in the female corresponding to the larger mean size of male newborn infants.

Palatal Asymmetry.—Asymmetrical palates are not infrequently seen in infants, even during the newborn period. They are regularly associated with asymmetry of the head (Fig. 4).

SUMMARY

1. The palatal dimensions were measured from plaster casts in 428 infants under one year (305 males, 123 females), and means and standard deviations calculated by certain subdivisions of age.

2. The palate during infancy is relatively broad and flat, and the dental sacs are usually plainly outlined.

3. The palatal dimensions are poorly correlated with each other and with other body dimensions.

4. During the first year the breadth-height index of the palate remains unchanged. The palatal height becomes relatively greater, and the plane of maximum breadth moves posteriorly.

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DIFFICULTIES IN LABIAL ARCH MANIPULATION AND SOME SUGGESTIONS FOR OVERCOMING THEM*

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IT WOULD seem advisable, before dealing with suggestions for overcoming difficulties in manipulation of the labial arch wire, to consider the recognized general requirements of orthodontic appliances and, with these standards as objective, to evaluate the merits of this particular mechanism.

Of fundamental importance is the necessity for stability of anchorage. In this respect the labial arch wire frequently has been found to fall short of the recognized standard. Equally essential is its ability to exert pressure upon malposed teeth sufficient to stimulate in a physiologic manner a return to their normal functional relationship. Judged from this standpoint, the labial alignment wire, skillfully applied, has proved to be comparatively efficient. Another essential to be considered is that of delicacy. The labial arch wire possesses this characteristic only when employed in wires of small diameters.

Though we recognize other requirements of orthodontic appliances, such as cleanliness, simplicity, and inconspicuousness, these do not enter into consideration here, of the difficulties of labial arch wire manipulation. I shall, therefore, limit the discussion to a consideration of those difficulties, and suggestions for overcoming them, as concerned with these points—stability of anchorage, efficiency, and delicacy.

DIFFICULTIES OF STABILIZATION

As already stated, the labial arch wire has not been found to measure up to requirements with regard to stability of anchorage. This imperfection is not peculiar alone to the labial arch wire, but also to most types of simple appliances. Several factors may be responsible for this.

The labial arch wire is usually attached to a limited number of teeth, the resistance of which may not prove adequate to accomplish successfully the required tooth movement. Obviously, the remedy for this difficulty is to reinforce the anchorage sufficiently by means of a lingual auxiliary wire or lingual arch so that the resistance will be adequate to withstand the applied stress.

It frequently occurs, also, that a tooth used for anchorage is itself being moved in line with (or at an angle to) the direction of the opposing force. For example, action may be placed in an arch to rotate an anchor tooth and intermaxillary elastics applied to tip it posteriorly at the same time that it is, through an auxiliary spring or ligature, offering resistance to move a premolar buccally.

Sometimes, however, because of the rotation lingually of the mesiobuccal cusp of the anchor tooth, it is impossible to insert the labial arch into the tube

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without impingement upon the soft tissues. If the anchor tooth is rotated only a small amount, the buccal tube may be placed in its correct relationship with the band and an auxiliary wire of small diameter (0.025 inch) soldered at right angles to the gingival surface of the arch about one-half inch forward of the anterior end of the tube, then bent posteriorly parallel with the arch, inserted into the tube and stabilized by passing it through a ring soldered to the arch about the mesial of the tube. When placed in this position, the ring acts as a stop to the auxiliary wire being forced further through the tube. By tipping the ring buccally slightly, impingement upon the soft tissues is avoided. If the arch is ligated to the anterior teeth, the ring may be placed farther forward, in which position it allows the spring more flexibility. (Fig. 1.) The auxiliary wire is later removed when the tooth is rotated sufficiently to allow the main arch wire to enter the tube. The use of this auxiliary wire often avoids the removal of the anchor band and the changing of the tube, which frequently is necessary when the rotation is accomplished by the main arch wire.

Combination Tubes.—When there is so much rotation that even the auxiliary wire would impinge upon the soft tissues, a combination of a round and a rectangular tube soldered together may be used to advantage. These tubes are

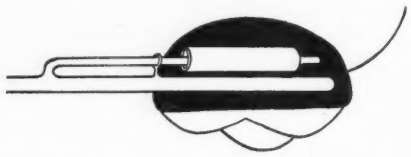


Fig. 1.—Auxiliary wire (0.025 in.) on labial arch inserted into tube.

not attached at right angles to each other, but at such an angle that, when the vertical or rectangular tube is attached to the band parallel with the long axis of the tooth, the round tube tips gingivally at its anterior end just the correct amount for the insertion of the arch with but little or no upward bend. Fig. 2 illustrates a side view of the combination tubes. The rectangular tube is similar to that used with the Ellis[1] lingual arch. By filing the flanges of the rectangular tube almost all away at one end, and none whatever from the flanges at the other end, the correct angle is made for the attachment of the round tube. Before soldering it, a groove is placed in the prepared end of the rectangular tube with a small cylindrical stone mounted in the dental engine. The two tubes are mounted on a soldering jig as shown in Fig. 3 and joined with 22 K. solder. A small round hole remains at the anterior border of the rectangular tube when the round tube is soldered to it. This is convenient for the insertion of a 0.022 inch lock. An end view of the tubes is shown in Fig. 4. Fig. 5 illustrates a lock inserted into the hole at the anterior end of the tubes.

If only one anchor tooth is rotated, the band for that tooth is provided with the combination tubes and the arch wire bent occlusally to the vertical rectangular opening and a post and lock soldered to the arch wire at the proper position, action being placed for rotation of the anchor tooth before insertion

of the post into the tube. (Fig. 6.) After the anchor tooth has been rotated sufficiently to allow the arch wire to pass into the round tube without impingement upon the soft tissues, the post is removed and the arch adjusted to pass

Fig. 2. Fig. 3.

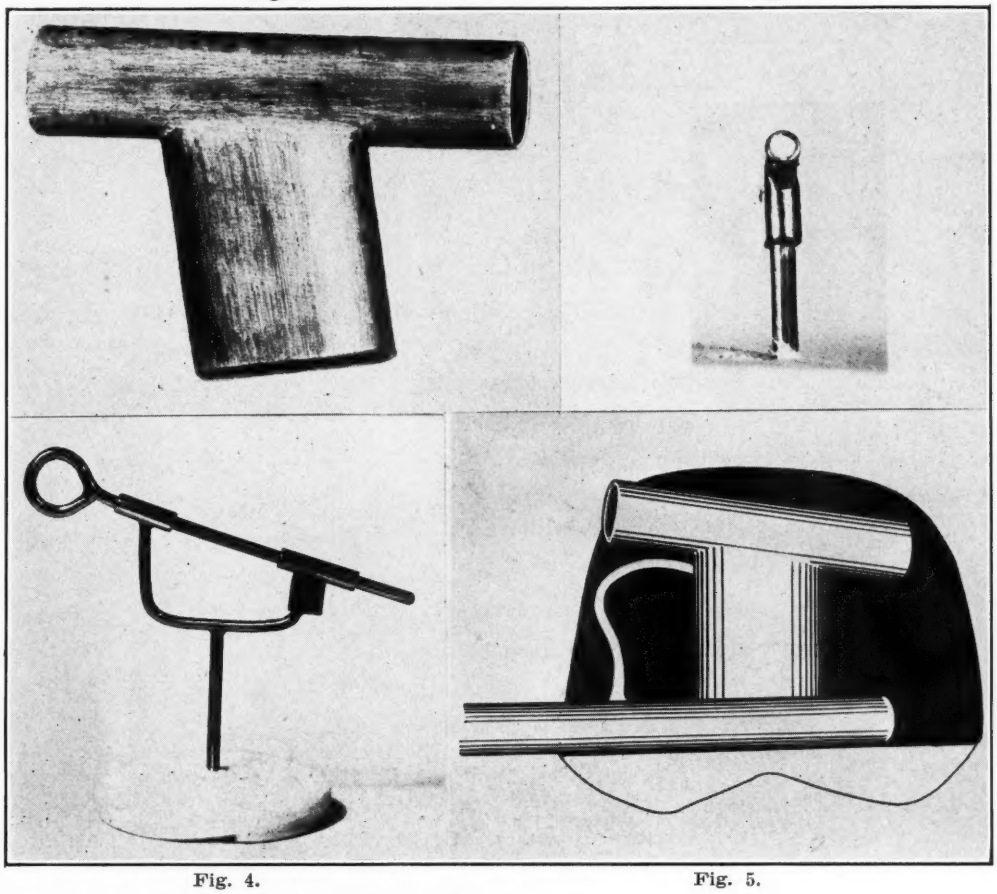


Fig. 4. Fig. 5.

Fig. 2.—Side view of combination tube.
Fig. 3.—End view of combination tube showing hole for insertion of end of lock wire.
Fig. 4.—Soldering jig for joining the two tubes together at the proper angle.
Fig. 5.—End of lock wire inserted into hole in tube.

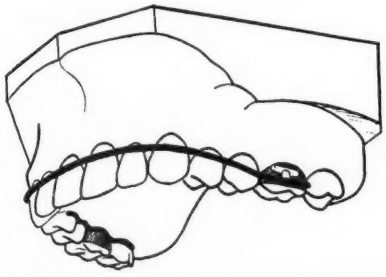


Fig. 6.—Rectangular post attached to labial arch wire and inserted into vertical part of combination tube for the correction of marked rotation of the anchor tooth.

into the round tube. On the opposite side, a lingual extension to the adjacent teeth is soldered to the anchor band for stability, and the arch wire inserted into the horizontal round tube in the usual manner.

Where similar rotation of both anchor teeth is required, the rectangular posts may be attached on both sides, and action placed in the appliance to obtain this reciprocal movement. This combination of tubes facilitates the alternation of the labial arch wire with other types of appliances without the necessity of removing the anchor bands.

Another factor entering into the difficulty of stabilization of anchorage is that the bone offers a more or less unstable resistance to the stress placed upon it; thus undesirable movement of the anchor teeth may occur, notwithstanding the fact that the anchorage is most often obtained from the largest teeth, namely, the first permanent molars. As well as adding lingual reinforcement, as before mentioned, the anchor teeth may be further stabilized against undue stress upon the overlying bone by the use of horizontal elliptical buccal tubes, the arch wire being flattened to fit. When these tubes are employed, any movement of the anchor teeth will be mainly a bodily one.

Further, owing to the fact that it is a labial appliance, it requires, in addition to the buccal tubes on anchor bands, intermediaries, as for example, ligatures, auxiliary springs, bands with spurs, etc., for the movement of individual teeth and for additional anchorage. This will be dealt with in more detail under "efficiency."

EFFICIENCY

Having considered the difficulties encountered in meeting the first requisite of orthodontic appliances, namely, stabilizing of anchorage, let us now turn our attention to the difficulties encountered in obtaining the maximum of efficiency in the operation of the appliance. The methods employed to assist stabilization of anchorage usually help, also, to increase its efficiency. Perhaps the chief handicap to this latter is the use of ligatures, not only because of the possibility of these coming off before the next adjustment of the appliance, but also because of the possible irritation to the soft tissues. It is, therefore, desirable to eliminate ligatures as far as possible, and to substitute more stable forms of attachment, such as, auxiliary springs, bands with attachments (spurs, hooks, or open tubes as designed by J. D. McCoy[2]).

Auxiliary Springs.—Auxiliary springs may be attached to the arch for various tooth movements. For the tipping of canines and premolars anteriorly or posteriorly, the type of auxiliary shown in Fig. 7 may be used. The loop permits adjustment in all directions, while the flattening of the free end allows it to pass readily between the soft tissues and the tooth. Similarly, the buccal tipping of erupting canines or premolars may be accomplished by the attachment to the arch wire of a suitable type of coiled auxiliary spring, as shown in Fig. 8. This spring has an extra-angular coil, and may be soldered to the lingual aspect of the labial arch wire either anterior or posterior to the premolar and set against the lingual incline of the buccal cusp to guide the tooth to place. The free end must always be gingival to the coil; the latter then acts as a fulcrum to prevent the spring sliding off the incline of the tooth. If the tooth requires buccal move-

ment and is also rotated, the free end of the spring is then set against the most lingual incline of the buccal cusp and action is placed in the spring to rotate the tooth while it is being tipped buccally. Though it interferes slightly with the eruption of the tooth while attached, as soon as the tooth is tipped to place, the auxiliary wire is removed and the eruption of the tooth continues. After it has erupted further, a similar but longer spring may be placed against the lingual surface of the tooth, either for lingual tipping to hold it in its position, or to continue the buccal tipping. (Fig. 8.) Modified forms of these auxiliary springs may also be used with the lingual arch. Fig. 9 illustrates three other types of auxiliary springs suitable for attachment to the labial arch for lingual tipping. By the attachment of a small round tube to the arch wire at the proper position, auxiliary springs of small diameters (0.01 inch) made of stainless steel may be employed. One end of the stainless wire is inserted into this small tube, then wrapped around the arch wire a few times, and bent the desired shape to accomplish the necessary tooth movement.

Bands With Attachments.—Mention has been made of the lingual extensions attached to the anchor bands. When desired, they may terminate in loops at the anterior end. If it is desired to rotate the mesial corners of the anchor tooth

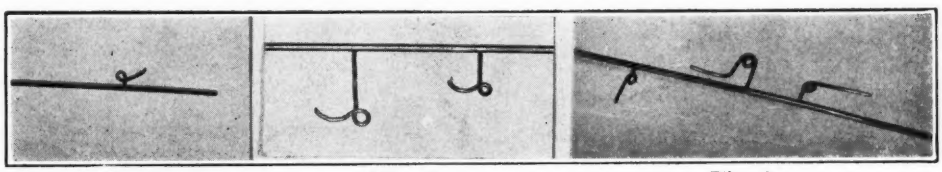


Fig. 7. Fig. 8. Fig. 9.

Fig. 7.—Single coil horizontal spring for anteroposterior movement.
Fig. 8.—Auxiliary springs for buccal tipping of canines and premolars.
Fig. 9.—Three types of auxiliary springs suitable for lingual tipping or intrusive movements.

buccally, these extensions may be bent lingually and then ligated to the labial arch wire by means of a stainless steel ligature passed through the loop at the anterior end of the extension. If the lingual extensions to the anchor bands are not attached when the anchor bands are cemented, instead of removing the anchor bands, removable extensions may be fitted close to the gingival of the premolars, above the convexity, and attached to the labial arch wire by means of a coiled auxiliary spring extending buccally between the premolars. A few of these, made up, may be kept on hand ready for use. (Fig. 10.) If the deciduous molars are in position, a groove may be made on the lingual surface of these teeth near the gingival, as shown in Fig. 11 and the lingual extension fitted into it. Figs. 12 and 13 show the removable extension attached to the arch. Of course, restorations will be required in these grooves upon the removal of the lingual extension. Such a groove often also assists the stabilization of a lingual arch if a small lug is soldered to the lingual appliance at the proper place.

For the rotation of premolars, bands may be made, and auxiliary springs soldered to the buccal surface of the band before cementation. The free end of

the spring is bent around the labial arch to accomplish the rotation after the cement has hardened. The McCoy open tube may be used for rotation, not only of premolars but of incisors and canines.

Molar Locks.—A difficulty with the manufactured labial arch is the possibility of breakage in the threaded portion, either through the fatigue caused by

Fig. 10.

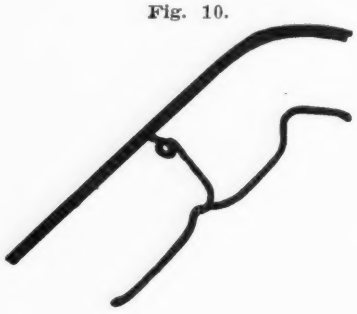
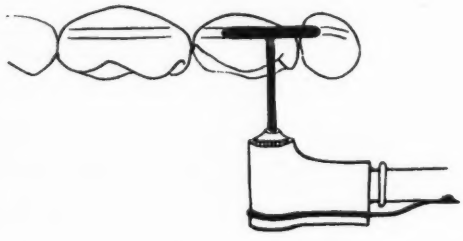


Fig. 11.



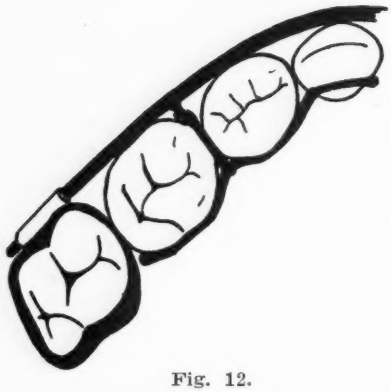


Fig. 12.

Fig. 13.

Fig. 10.—Lingual extension attached to labial arch.
Fig. 11.—Cutting groove in lingual surfaces of deciduous teeth.
Fig. 12.—Occlusal view of lingual extension in position.
Fig. 13.—Lingual view of extension.

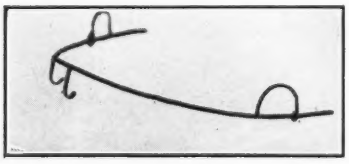


Fig. 14.—An adjustable loop for increasing the distance between incisors and molars.

the constant pull of intermaxillary elastics, or when the elliptical type of arch is being torqued for the buccal movement of the roots of the anchor teeth. The use of the laboratory-made arch, eliminating the threaded portion, helps to overcome this difficulty. Arches of different lengths may be made up and kept on hand ready for insertion without delay if a break does occur. The use of the plain arch permits the addition of molar locks for either the opening or the

closing of space between the incisors and the molars. One form for the opening of space was first reported in the literature by Arnold[3] and is illustrated in Fig. 14.

Fig. 15 illustrates another type of loop lock which may be utilized to retract incisors. The locks are soldered to the labial arch about 1.5 mm. from the anterior end of the buccal tubes. The posterior arm of the lock is tipped forward by opening the loop. When the arch is inserted, the posterior arm is pressed backward and inward so that it engages the arch behind the tube. It then exerts definite traction until the tube touches the anterior end of the spring unless the action is expended before that time. It can thus be made self-limiting.

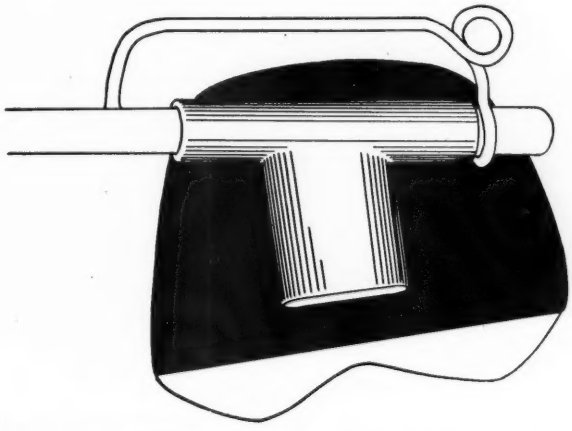


Fig. 15.—An adjustable loop lock for closing space between incisors and molars.

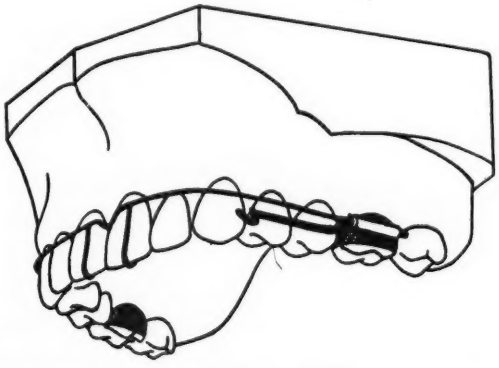


Fig. 16.—Labial arch wire of small diameter soldered to heavier end sections bent occlusally to overcome excessive tipping of the anchor teeth in the use of intermaxillary elastics.

DELICACY

To meet the modern demand for delicacy in orthodontic appliances, the gauge of the labial arch wire may be reduced without impairing its efficiency for lateral tipping of buccal teeth and for lingual tipping and intrusion of incisors. It is not advisable, however, to use the smaller gauge wire when intermaxillary elastics are used with the free arch, as in the posterior tipping of molar teeth. Here, it is more desirable to use the heavier wire to overcome the tendency to breakage just anterior to the buccal tubes. Where the larger gauge arch has

been employed to tip the molars posteriorly and it is desired to reduce the gauge of the anterior section, the same tubes may be used, and end sections to fit the tubes soldered to the smaller gauge wire for lateral expansion of the buccal teeth or intrusive movement of the anterior teeth. The greater elasticity of the smaller wire lessens the tipping of the molar teeth while resisting the force for intrusion of the anterior teeth. If intermaxillary elastics have to be used, the larger gauge auxiliary wires may be bent first occlusally at right angles just anterior to the tubes then horizontally forward, ending in a hook to which the elastics may be attached. As this is a stiffer wire, and is occlusal to the main arch, there is less tipping action upon the teeth from the pull of the elastics. (Fig. 16.)

With the larger gauge arch the tendency to irritation of both cheeks and gums is greater because of its extra bulk. Where there is constant difficulty of cheek irritation from the arch wire, this is often found to be the result of external pressure, either from resting the cheek upon the hand in the daytime, or from a pillowing habit at night. Upon discontinuance of the habit, this irritation usually disappears.

Lourie[4] first advocated the use of a heavier labial arch bent gingivally, and acting as a base to which auxiliary wires or clasps for the movement of individual teeth may be attached. When these auxiliaries are used in conjunction with bands and tubes cemented upon these teeth, rotation and root movements may be successfully accomplished.

This method, which now has many advocates, satisfies the demand for delicacy, at the same time improving the important hygienic factor—cleanliness and at the same time renders the appliance less conspicuous.

CONCLUSION

Even though many difficulties are presented in the use of the labial arch wire, it is evident that by exercise of ingenuity these can, to a large extent, be overcome. There is little doubt that despite its shortcomings it will continue to find favor as a tipping appliance, because of its simplicity. Moreover, with modifications similar to those made by McCoy[2] and Lourie,[4] it may be successfully used as a root-moving appliance.

Finally, if the limitations of the labial arch are realized, and the cases for its use are carefully selected, it has incorporated in it principles which mark it as a useful and indispensable orthodontic mechanism.

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WHAT IS YOUR FACE VALUE?

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HAVE you ever bought an article which you did not especially need or want but which attracted your attention because of the interesting or unusual appearance of the carton or container in which it was enclosed? Of course, you have, and so has almost every one else. We are all very much inclined to judge things and *people* on "face value," a term well known to all of us. In spite of the fact that we like to consider the judgment on which our choice of things in life is based as arising from some deeper sense of value discrimination, practically all of us believe in and are guided by face value. It is really face value that influences us primarily in the choice of our food, our clothing, our recreation, our friends, and our surroundings. Everywhere in nature the same rule holds true: appearance is important. For example, the attractive coloring of birds and animals is known to serve a definite purpose in their fight for existence. So, too, with human beings, the appearance of the face is an important factor in determining one's happiness and success in health and life. While we all know of persons who were deformed or whose faces were, to say the least, unattractive but who were, nevertheless, very successful in life, in almost every case we find that these persons were possessed of great genius. They were bound to succeed in spite of all handicaps. In any event, their poor facial appearance certainly was no asset to them. We can easily agree then that people owe their success, in a great measure, to outward appearance.

The value of a pleasing appearance is well recognized also in the business world. In order to make the products they have to sell more attractive, manufacturers spend millions of dollars yearly in their attempts to perfect the appearance of the package in which the articles are sold. Today the preparation of bottles, boxes, cartons, and other containers has become a scientific art which is based on the philosophy that the things most frequently bought are those that please and attract the eye of the customer. Concerns which use the telephone in selling merchandise choose salespeople primarily because of the pleasant sound of their voice. At the same time, employers recognize the fact that salespersons who come into personal contact with customers must have a pleasing appearance. If their looks are against them, or, to state it another way, if their "face value" is low, the salesperson is handicapped because the customer is naturally repelled. It is in personal relationships that facial appearance is of even greater importance than a pleasant voice.

Face value when applied to people is more than a mere popular expression because it means exactly what the words imply, namely, the value of the per-

Broadcast for the Medical Information Bureau, New York Academy of Music in cooperation with N. Y. T. B. & H. Assn., Station WNYC, July 25, 1935.

son's facial appearance. Whether the person with whom we come in contact is the type that attracts or repels us; whether he arouses in us such favorable reactions as sympathy, pity, friendliness, trustfulness or, on the other hand, whether we react to him with suspicion, distrust and antagonism, depends primarily on the appearance of his face. It is true that in time we may change the opinion formed on first impression. These unfavorable impressions, however, may make us unwilling to know the person better, to seek his friendship, to offer him employment, to buy his merchandise, to employ him in a professional capacity, or indeed to have any further contact with him. Since our face plays such an important rôle in shaping our life, it is my intention to consider at this time some of the forces that influence facial appearance and the means at our command by which we may, in turn, control these forces in our favor. I shall discuss here some of the means at our disposal whereby we can improve the appearance of the face and more especially what the mother can do to help her child in developing a normal, well-balanced face.

When we examine the faces of groups of people, such as we see at a baseball game or at the seashore, we note that no two are exactly alike. Even in the case of twins or, for example, the faces of the Dionne quintuplets, whose pictures so often appear in the newspapers, we observe that each face shows some difference from the rest, no matter how slight. Perhaps one of the greatest factors responsible for normal facial appearance and attractiveness is the proper arrangement of the teeth in the jaws and the relationship of the jaws to each other and to the rest of the head. The fact that tooth arrangement and jaw relationship influence facial appearance is not as yet generally known, although we are all well aware that normal healthy teeth play an important part in making the face attractive. Think of your favorite motion picture actor and actress, how hideous they would appear if they had teeth missing or if their teeth were badly arranged, abnormally spaced, protruding, crowded, or if their jaws presented an abnormal appearance. The mouth, teeth and jaws lend character and distinctiveness to the face. There are no two mouths, no two sets of teeth and not even two individual teeth in different mouths or even in the same mouth that are exactly alike. Teeth then vary in different people and help to give each his distinctive facial appearance. We can see the effect of the teeth in the changing facial appearance of those who lose their teeth through disease or accident, or through neglect to visit the dentist regularly. When the lost teeth are replaced by artificial ones, the appearance of the face is again changed, in almost all cases it is improved. It is not necessary, however, to wait until the teeth are lost in order that new, artificial teeth may be obtained to improve the appearance of the face. At that late stage of life, facial appearance is not nearly so important as it is earlier when the child is just beginning to make his way in the world. It is the poorly arranged teeth and the abnormally developed jaws of children and young adults that are especially deserving of our attention.

Modern dentistry includes among its subdivisions the specialty of orthodontia. Those practicing this specialty of dentistry are known as orthodontists.

They devote their attention to the treatment and correction of irregularities occurring in the natural teeth and jaws. This service is available to children and in many instances to adults whose teeth are badly arranged or whose jaws show certain malrelationships. Next to endowing their children with good health, there is nothing of greater value that parents can give a child to help him or her through life than a pleasing well-proportioned face. How often do we see children dressed in the height of fashion, who are receiving the benefit of all sorts of training such as music, dancing, and elocution, but whose faces are at the same time grossly neglected and allowed to develop with some abnormality that could be prevented or at least greatly reduced if the professional advice and care of the dentist or orthodontist were obtained.

Many mothers feel on observing a developing abnormality of their child's jaws or teeth that the condition arises from some family trait and that it is something which cannot be remedied. While many conditions of crowded teeth and malformed jaws do appear to run in families, it does not necessarily follow that they are beyond the aid of the orthodontist. I have stressed in this talk the importance of proper tooth and jaw relationship to facial appearance. There is, however, another reason why mothers should not allow their children to go through life with facial abnormalities caused by poor teeth and jaw relationship without attempting to have the condition corrected. I have reference to the mental health and happiness of the child. A mother whom I consider to be of rather more than average intelligence recently consulted an orthodontist after being advised to do so by a dentist, because she noticed that her child smiled in a rather peculiar manner. On inquiry, the child informed the mother that she did not feel like smiling at all, because in doing so she showed her crooked teeth. The child was only twelve years of age and yet she was fully conscious of her abnormal mouth condition. When a child realizes that she has some facial deficiency, she is very likely to think of the condition constantly and to develop some mental difficulty which may eventually interfere with her normal growth and development, including progress at school.

Those who specialize in the correction of speech defects are fully aware of the important rôle played by the teeth in the development of correct speech. While the correction of tooth abnormalities, such as crowding, abnormal spacing and other malpositions of the teeth will not automatically eliminate speech defects, it is generally recognized that there are many conditions of speech deficiency that can never be fully corrected if the dental condition is not improved. Sound, well-arranged teeth and normally positioned jaws are, therefore, important not only because they add to facial appearance but also because they add to our happiness and chances of success in life.

The mother should take the child to the family dentist for a periodical appraisal of the dental condition. The dentist should be consulted not only for the purpose of having the child's teeth filled and the badly decayed teeth extracted, but also to make sure that the child's teeth and jaws are developing in

such a manner as to allow for a normally proportioned face and to permit the child to retain the teeth during natural life. The mother herself is not always competent to judge the child's dental condition. Certainly a visit to the dentist or orthodontist even when it discloses the fact that the child is not in need of any services is as well worth the mother's time as when such examinations show the child to need dental attention.

Benjamin Franklin said, "Take care of your business and your business will take care of you." If we may apply this axiom to our purpose, we can say, "Take care of your teeth and they will take care of you."

ON THE GRACES AND ANXIETIES OF TEETH STRAIGHTENING*

HAVING spent more time in the orthodontist's chair than I feel is my due, by dint of my experience I am certain that I am well qualified to expose to the innocent public the virtues and the vices of teeth straightening.

I shall first relate the virtues, for they are so few that it will take little time or space to enumerate them, and hence I shall have the remainder of this enlightening manuscript free to inform the reader of the horrifying events that weekly befall me.

As I stop to meditate upon the many joys that will be mine when my poor misguided teeth have finally been steered into their orthodox channels, I realize the futility of my numerous aspirations, for one's teeth are not noticed unless they are gold or false, and since mine (as yet) are neither, I perceive that my sufferings are practically all in vain. I am delighted, however, to find that at the end of this ordeal I shall be able to smile and still have a free conscience. If, at present, I should open my mouth in order to express some unbounded joy and show my husky tusks, I should probably be looked upon with great disdain, for my otherwise perfect orifice would disclose a rather irregular set of bony appendages. Since one of the major doctrines of life is to keep smiling, I should never be a success without being subjected to the art of orthodontia; hence it is evident that in order to become a George Washington, Abraham Lincoln, Henry Ford or Brooke Johns, one must be the owner of a perfect set of teeth, and, that no matter how great the evils and discomforts of having one's teeth straightened, they will never outweigh the one merit—the unrestrained ability to smile.

As most of the staggering iniquities that go hand in hand with orthodontia lie in the frequent visits the trade requires, I shall recount them in chronological order. First of all, as one enters the waiting room of one of these teeth-straightening parlors, one does not experience the same sensation as that of visiting a civilized dentist, namely, that of sensing a temporary discomfort to be endured for a short time. Rather one is impressed with the fact that the bothersome frequentations will occur every single Saturday for unnumbered years. And what is more, these visitations are so contrived as to consume the better part of a Saturday and therefore disrupt the major portion of one's entire week-end vacation!

As I was saying, as one enters the office with dread manifesting itself in the form of cold sweat upon one's brow and a deadly pallor upon one's cheeks, instead of being confronted by a waiting room composed of orderly, toothless old men who generally inhabit the office of an ordinary dentist, one perceives through the flying magazines and instructive epithets a veritable kindergarten, a mob of uncontrollable children, and a few older sufferers sitting on the sidelines with an air half of amusement, half of mental anguish

*Written by a patient and sent to the JOURNAL by an orthodontist.

and disgust in evidence upon every feature of their noble countenances. Ah, poor dears! Why is it that children no longer have "white and shining ossifications"? What is the present generation coming to?

However, one sits among his fellow sufferers until one in turn is summoned into the innermost of the sanctified chambers. In these one is compelled to wait further developments for what seems an interminable length of wasted time. At this point one usually has been wrought up to the pinnacle of nervous anxiety; however, if one has strong powers of resolution and the dentist's previous victim a detaining manner, one may steal a few moments of delicious repose. One may also have the good fortune (if extraordinarily wary) of operating the revolving, cooling, sanitary, porcelain basin which is attached to the seat of punishment. With several twists of a little inconspicuous knob, the water may be set merrily swishing to the left, and with another deft movement of the forefinger, the water may be converted into a veritable thunderstorm. Oh, if it were not for this remarkable piece of machinery, how could I endure this undescribable period of expectation? Of course, one can make a rapid ascension and a descension with equal celerity while one is in a dentist's chair, but this sensation is hardly worth explaining, for one may experience it in any modern tonsorial parlor.

Finally, after much trembling on one's part, and even more delay on the orthodontist's part, the latter enters, closely followed by his assistant. A short sketch of the ordinary teeth straightener should be given. He usually enters shrugging his shoulders and simultaneously dipping his hands into an antiseptic of vile aroma. He seems to be an efficient manager, and probably would be a traffic cop if this new type of graft had not been discovered during the twentieth century.

The teeth do not exult, but they know their mighty king. They are unwilling in their subjection, but more in sorrow than in anger. They had previously seemed to be a hopeless case, but they felt themselves bound to change; forced, conglomerated, crowded onward, irresistibly impelled by fate and Dr. X.

Having read the minutes of the previous meetings, this remodeler of mouths proceeds to undo his work of the previous week. First, he seizes his miniature pickaxe, chopping and tugging at the moorings of his brasswork, and with a mighty gritting and scratching, which sends numerous shivers down one's spinal column, the various pieces of apparatus come off. Then he continues, by means of a minikin mattock, to scratch and pick at each tooth, one by one, until the pain becomes unbearable, and then to add to the disgust and vulgarity of the entire affair, one is informed that one may expectorate in the basin at the left. After this pleasing little episode is finished, work is commenced once more, and as the wires, which seem large enough to support the Washington Monument during a tornado, are slipped back into place, the spine is again considerably agitated. Of course each tooth is carefully bound with a piece of string (thick enough for the Olympic tug-of-war) and anchored to some appliance which is found in some remote corner of the mouth. After laboriously pulling at each cord, the master of ceremonies queries as to whether or not his playful jerks hurt, at the same time keeping three-quarters of his monstrous fist shoved down one's throat, so that it is utterly impossible

for one to make the slightest exclamation. This always reminds me of the story about the man who was gnashing his teeth at a furious rate and who, when advised to be more careful, said, "Ach, vy shood I, dey ent rilly mine et all."

And what makes the situation even less capable of endurance is the kittenish female assistant who rushes around making much ado about nothing as only one of her sex can. At last the sympathetic dentist gives your palate one more gentle tickle and politely and suavely excuses you, knowing all the while that for the next few meals you are going to be able to eat only applesauce, mashed potatoes, mush, and other such substantial food and that the thought of returning on the following Saturday will weigh heavily upon your mind.

Oh, gentle reader, would that I possessed words to illustrate fully my trials and tribulations, my innumerable sufferings; but as usually happens in life, he who has experienced some noteworthy event is most unfit to relate it. Realizing, however, what a subtle imagination my reader possesses, I shall pass over parts of my more painful experiences as unprintable.

Upon leaving the building of these tooth-turners, one opens one's mouth and immediately the brass bands blare forth and inform all those passing of their immediate whereabouts. The only consoling thought one has is that in years to come one's teeth—which may be falling out by the time the job is completely finished—will resemble those of the man in the tooth-paste advertisement. But even that is not a certainty, for, as things in life often go, one's teeth may snap back into their former habits after they have supposedly been reformed.

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OPERATIONS FOR CANCER IN AND ABOUT THE ORAL CAVITY

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IN a preceding article, "Radium Application in Oral Surgery," certain "surgery of access" for the purpose of gaining adequate exposure so that foci of radium may be accurately implanted was described. In a subsequent article, the surgery of the tributary lymphatic areas will be discussed. The surgery discussed in this article will be confined to that of the local lesion when the object is one of total excision or destruction.

For the past five years I have both applied radium and excised the lesion in possibly about one-third of my cases. As a rule, radium was applied first, and, if the lesion healed without question of a doubt, no subsequent surgery was carried out. If after appropriate radium application, however, on palpation any thickness remained or a questionable healing occurred, the local lesion was excised in the manner considered the most expedient for the given lesion. When the cancer involved bone, main reliance was placed upon adequate surgical methods—either total excision or destruction by diathermic coagulation or the actual cautery. Besides "access surgery" primary excisional surgery often is indicated in early epitheliomatous lesions where total excision does not involve a really serious or a really deforming operation. Therefore, in certain very accessible lesions known to be of the adult squamous cell variety in which

NOTE.—The only element of newness that this article may contain is shown in the selection of certain somewhat newer procedures, methods recommended, and the elimination of some of the older standardized operative procedures which have been superseded for the most part by other methods. To make this selection I have gone back over my cases during the past five years and have described only those procedures which have been used for one type of lesion or another. Other operators might use somewhat different procedures, and rarely we may again revert to some older standard procedure if the occasion seemed to demand it, but the mere fact that it has not been used would make the operation an unusual one and, consequently, not one of great practical use.

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This is the eighth of a series of articles upon the subject of malignancy in and about the oral cavity. All phases of the subject are to be included.

the complete excision or destruction of the local lesion could be easily accomplished; excisional or destructive methods alone were selected as an appropriate method of treatment, and no further treatment by radiation was deemed necessary as the object of therapy would in this type of lesion seem to have been accomplished. In local recurrences, in questionable indurations, ulcerations after adequate irradiation methods have been used, in lesions showing a fibrosis from previous disease, in certain fungating bulky infected lesions where reaction to radiation is likely to be unfavorable and in lesions involving bone, excisional methods of a more radical type usually are indicated. More and more, as better diathermy machines become available, it is being recognized that such excisions are often more expediently and efficiently carried out with the diathermic needle, loop, or coagulating electrode than with the ordinary scalpel or even the cutting cautery.

Within recent years surgery for accessible cancer in and about the oral cavity has been thrown on the defensive. For example, in the cases of epithelioma of the tongue, good authorities have recently stated: "Our conviction is that extensive and mutilating operations, total or partial glossectomy, have now no place in the routine treatment of cancer of the tongue as the first line of attack on the primary lesion." (Spencer and Cade.) One can hardly disagree with this statement when the records show that in epithelioma of the tongue at the present time radium in good hands will cause a disappearance of the primary lesion for the time being in nearly three-fourths of the cases and local recurrences occur in only about one-fourth of the cases.

OPERATIONS FOR CANCER OF THE TONGUE

At the present time the following operations are useful in the management of cancer of the tongue: (1) v-shaped excision; (2) excision of a varying portion of the tongue through the mouth; (3) partial bilateral excision of the tongue through the mouth; and (4) lateral submandibular excision of the tongue.

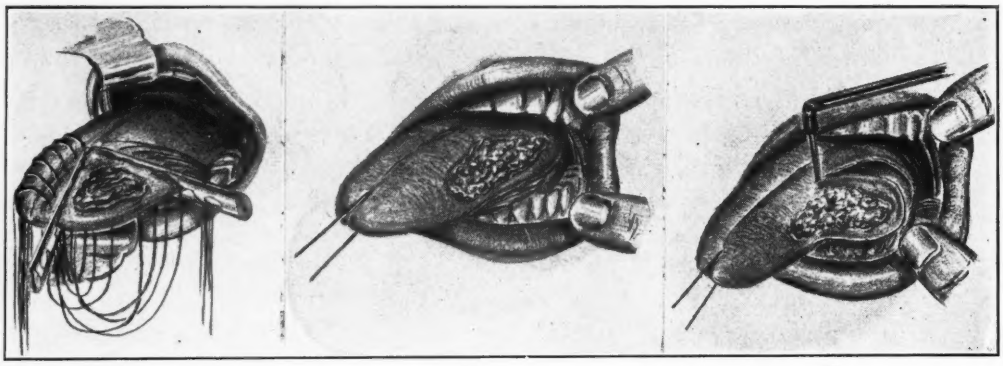
V-shaped Operation.—The so-called V-shaped excision of a neoplasm of the tongue is not uncommonly indicated (Fig. 1*A*). The operation is especially useful for small and medium-sized neoplasms situated in the anterior part or on the lateral border of the tongue. The whole of the lesion is obtained for study, and little or no deformity follows.

As the incision should be from 1 cm. to 1.5 cm. from the outermost border of a carcinomatous growth, it is applicable only at an early stage (Fig. 1).

The tongue is drawn forward and to the opposite side. The cheek on the side of the lesion is retracted. The proposed incision is outlined on the tongue. Heavy silk sutures taking in all layers of the tongue 5 mm. beyond the line of incision are placed as needed, crossing from one side of the proposed incisions to the other. Two long, narrow bladed, toothed hemostats are placed in a V-shaped position, held snugly but not clamped down. The V-shaped piece of tissue is excised. The sutures are drawn together and tied.

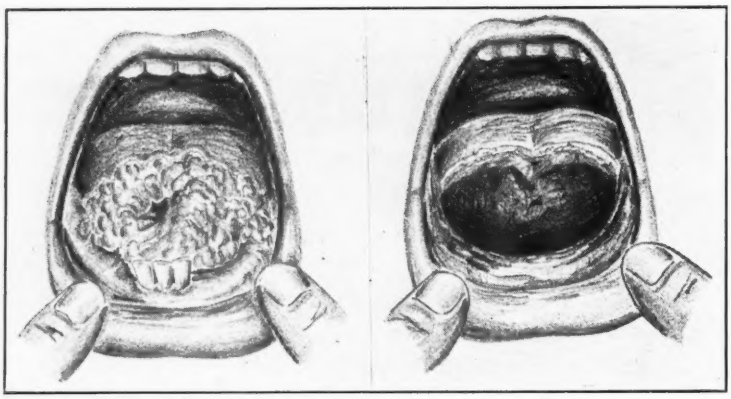
Excision of a Varying Unilateral Portion of the Tongue Through the Mouth.—When the lesion to be excised is too large or not located in the proper position to make a V-shaped excision of the preceding type, a larger portion of

the tongue may be excised along with any adjacent tissue which may be involved (Fig. 1 *B, C*). The indications for such an excisional procedure most often follow the application of radium where one is in doubt as to the effectiveness of the previous treatment and wishes to add a local excisional procedure as an additional precaution or to excise a suspicious induration or ulceration for therapeutic purposes or for diagnosis. Such an excisional method may be indicated primarily when the tongue shows evidence of an old fibrotic lesion as well as an epitheliomatous ulcer.



A. *B.* *C.*

Fig. 1.—*A*, Diagram of method of doing a V-shaped excision of the tongue. *B*, Diagram of carcinoma at the edge of the lateral border of the tongue for which one might do a lengthwise excision which one does not close. *C*, Diagram of excision with a diathermic needle.



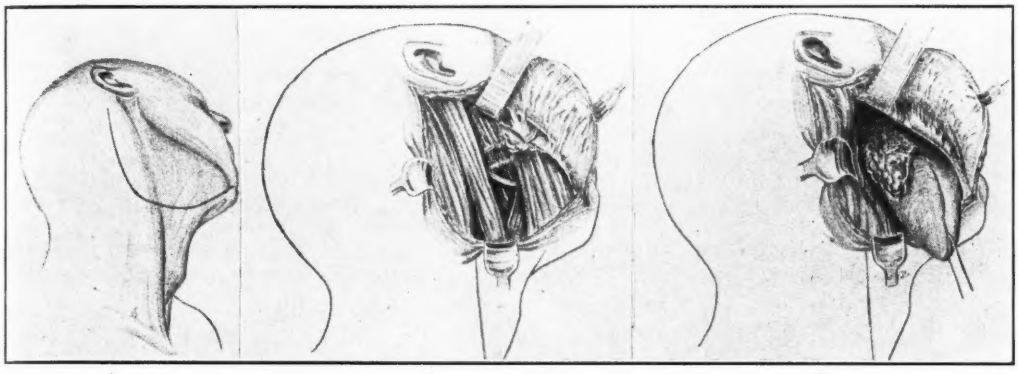
A. *B.*

Fig. 2.—*A*, Diagram of carcinoma involving the anterior tongue and slightly into the floor of the mouth. *B*, Diagram of method of excision from within the mouth with a diathermic loop and cauterization of the inner side of the mandible in one area. If the involvement extends to the hyoglossus muscle, such an excision would be indicated.

Of course, the greater the amount of tongue removed, the greater the resulting deformity. After more than one-third of the lateral half of the tongue is removed, an increasing interference with tongue mobility is to be expected. Following an operation which approaches hemiglossectomy, the tongue becomes bound down in the floor of the mouth, and the interference with speech and also with swallowing is considerable. When a complete hemiglossectomy is done, the disability may be as great as after a complete glossectomy.

The Operation.—In small lesions local anesthesia is sufficient. In larger lesions an intratracheal anesthetic is often preferable, as the pharynx may be packed off so that one can use the diathermic loop or the cautery knife without danger. In the large lesions the Rose position is preferable, as there is little danger of aspirating blood. A suction apparatus is used to keep the field dry.

A gag is inserted between the jaws, and the tongue is drawn forward by means of a ligature near the midline in the substance of the nondiseased half. The incision is made through the mucous membrane on the upper and lower surface of the tongue. The undiseased portion is pulled to the unaffected side. The diseased tissue is widely excised en bloc cutting through the affected side posterior to the lesion. One must always take a sufficient depth—at least 1 centimeter of normal tissue. The lingual artery is caught and a ligature tied about it. Other bleeding points are tied. Usually it will be deemed inadvisable to attempt primary repair. Thus, as a rule, the wound is packed with gauze which may be held in place by two or three stitches through or around whatever structures are available—tongue tissue or teeth.



A. *B.* *C.*

Fig. 3.—Lateral submandibular approach (Kocher). *A*, Diagram showing line of incision. *B*, Diagram of excision and exposure beneath the lower border of mandible. The areolar tissue and submaxillary triangle have been removed. *C*, Diagram of same approach as preceding. The oral cavity has been entered to the inner side of the mandible, and the tongue has been pulled out through the side of the mouth so the malignant lesion may be excised along with any involved tissue at the front of the mouth.

Bilateral Excision of the Tongue Through the Mouth.—Occasionally one sees a bulky infected fungating carcinoma involving the anterior part of the tongue and possibly some of the floor of the mouth where a partial bilateral excision may be of value (Fig. 2).

The operation should not be made an anatomic procedure with disregard of the pathologic involvement. What one actually does is remove the part of the tongue involved, any of the floor of the mouth which may be involved; and, if involved tissue approaches the inner side of the mandible, it is thoroughly cauterized so that the inner part is caused to sequestrate. The submaxillary duct is avoided if possible. First, the indurated area is outlined at least 1 cm. from the edge of the neoplasm. If one wishes to remove part of the floor of the mouth, the mucosa and subadjacent tissues are pushed to the midline on either side until the outer surface of the geniohyoglossus muscle is freed as far for-

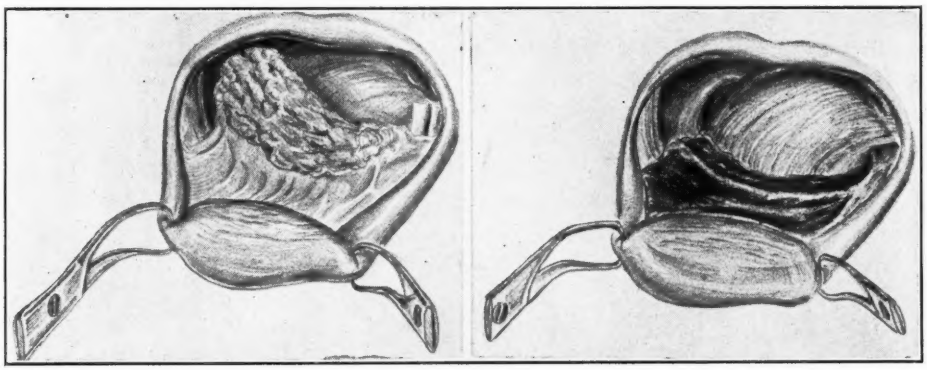
ward as the origin of the geneal tubercles at the symphysis. The lingual veins may be cut in doing this, and the lingual nerves are divided. If the mylohyoid muscle is involved, the operation is not indicated, but other tissues of the floor of the mouth such as the sublingual and intraoral part of the submaxillary gland may be removed. The diseased tongue is now drawn upward and the geniohyoglossus muscle made tense. The muscle may be cut across close to the geneal tubercles if needs be. The affected part of the tongue is now drawn well forward, and the tongue is crosscut through the muscles attached to the base from the lower to the dorsal surface at least 2 cm. beyond the posterior border of the growth. The lingual arteries are watched for and if possible are secured before being cut. The artery lies near the midline. It should be approached by shallow cuts. All bleeding points are tied, and in some instances a row of mattress sutures across the crosscut end may aid hemostasis. Now if one deemed advisable, a pack containing radium may be inserted into the cavity.

Lateral Submandibular Approach (Kocher).—This operation is ideal from a surgical standpoint in that the closest tributary lymph glands and the local lesion are removed at the same sitting, but it has the disadvantage that the mortality is somewhat increased by the double procedure (Fig. 3). When the side of the tongue and the floor of the mouth or solely the floor of the mouth are involved in the local epitheliomatous ulcer and it lies in apposition or is attached to the inner side of the mandible primarily, an excisional method of this type may be the better type of treatment. The operation may also be indicated subsequent to therapy with radium when the result is questionable or unfavorable.

When the floor of the mouth is involved as well as part of the tongue, this approach will allow adequate excision through the lateral floor of the mouth and adequate destruction of internal surface of the mandible or even excision of a section of the bone if such be required. On the other hand, the destruction of a part of the mandible involves the spontaneous separation of a sequestrum which prolongs convalescence for at least two months. Immediate resection of a portion of the mandible adds about 10 per cent more risk to the operation. When there is any evidence of metastatic involvement of the nodes other than the submaxillary nodes, the upper deep cervical nodes may be removed or the remainder of the neck dissection may be completed at a later date.

The Operation.—The operation when done under local anesthesia entails less risk for the patient. The incision begins below the mastoid and extends down along the anterior border of the sternoid muscle and then forward below the hyoid curving upward to the submental region. The skin flap without platysma is turned upward to the mandibular border. When the carcinoma is small, the exposure need not be more than two-thirds of this incision. The tissues of the submaxillary and submental triangles are dissected upward en bloc so that the digastric and mylohyoid muscles are exposed. The facial artery and vein are ligated above the digastric tendon. The submaxillary gland is pulled upward. The facial artery and vein are ligated as they cross the mandible above the gland. The soft tissues along the border of the mandible are freed. The outer surface of the mylohyoid muscle is exposed with its nerve lying in it. This muscle is divided parallel with the jaw. The mucous membrane up

to the floor of the mouth is likewise cut parallel to the mandible. The tongue may now be dragged out of the floor of the mouth. The tumor is excised along with a border of normal tissue. When the jaw is involved, a section is removed or the inside is thoroughly cauterized with a soldering iron or diathermic plate (Fig. 4 *A*). The amount of the excision of the tongue is determined by the extent of the disease. When the submaxillary glands are involved with carcinoma, if the patient's condition warrants it, the upper deep cervical glands should also be removed by partially crosscutting the sternomastoid muscles and exposing and ligating the deep jugular vein and removing the upper part along with the areolar tissues about the carotid bifurcation and well up above the lower pole of the parotid gland. If thought advisable, the lingual artery is exposed and ligated by separating the fibers of the hyoglossus a little above the posterior part of the greater cornu of the hyoid bone. The hyoglossal nerve and the lingual vein are preserved. When the operation extends posteriorly, a tracheotomy may be necessary either preliminary to or at the time of the operation.



A. *B.*

Fig. 4.—*A*, Diagram of malignant lesion involving the alveolar ridges of the jaw. *B*, Diagram after cautery destruction of such a malignant tumor. The involved tissue has been removed by a diathermic loop, coagulation current, or soldering iron. The alveolus is completely destroyed along with about one-half of the mandible. Only the lower edge of the mandible remains viable.

The wound is packed with a Mikulicz pack with the pedicle of the pack sticking out through the central part of the incision in the neck. Radium may be laid in the pack if one prefers.

Total Removal of the Tongue Through the Floor of the Mouth.—Once during the past five years a patient was seen in whom irradiation methods had failed, and the posterior tongue and the floor of the mouth were rather widely involved without neck metastasis, and in this case we did a total removal of the tongue through the floor of the mouth. The indications for this operation at the present time will be met only in the rarest of occasions. Therefore, it is not necessary that the operation be described in detail. Essentially it consists of a submandibular collar incision—ligation of the branches of the external carotid with a cross-section of the tongue just above the epiglottis and removal of it and all the tissues of the floor of the mouth.

OPERATIONS UPON THE LOWER JAW BONES FOR CANCER

For cancer involving the lower jaw bone, the following procedures may be indicated: (a) resection of a segment of the mandible; (b) cautery destruction of a part of the thickness of the mandible; (c) removal of metastatic gland in the submaxillary region with a lengthwise excision of a section of the mandible.

As a rule, radium does not affect adult squamous cell epithelioma involving bone favorably. A large dose of radium, even if it does cause the lesion to disappear, may cause prolonged pain or else a necrosis which takes months to sequestrate and separate. Therefore, as a rule, in accessible lesions involving the jaw bone primarily excisional or destructive procedures are indicated.

Resection of a Segment of the Mandible.—For resection of a segment of the mandible, the incision is made in a curved fashion below the mandible in the position which it is deemed advisable to excise. In some instances it may be

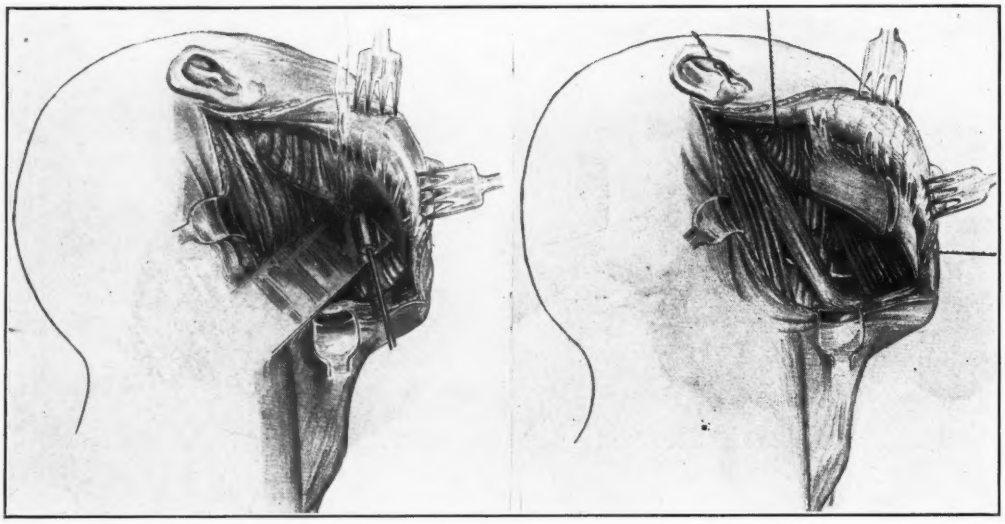


Fig. 5.—Resection of segment of the mandible. Diagram showing submandibular approach for a malignant lesion which has involved the mandible. Therefore the bone is thoroughly cauterized on the inside so that a good portion of it will sequestrate. The whole thickness of the mandible can be destroyed in this manner if the indications make it necessary.

possible to retain a portion of the lower edge of the mandible. When possible, it is well to do so. The mortality will be found to be somewhat less and little deformity of the jaw will result. When a complete resection of a part of one side of the mandible is done, the opposite side falls to the resected side to a certain extent and interferes for the first few days with swallowing of the salivary secretions which increases the tendency to postoperative pulmonary complications.

The soft tissues including the masseter attachment are removed from the bone externally. (Fig. 4 *B*.) Usually the facial artery has to be ligated as it crosses the edge of the bone in front of the masseter. When it is necessary to remove a whole section, a gigli saw is passed behind the bone, into the floor of the mouth and brought out over the top of the bone. Any teeth in the line of the saw path must be removed previously. The bone is then cut across. Access

to the mouth is obtained thereby. The lesion attached to the bone is excised and the bone cut across again in a similar procedure behind the lesion. The bone may be crosscut as far back as a centimeter or two above the angle. All bleeding points are ligated. The wound is packed with gauze, and the skin and platysma are loosely closed with interrupted dermal suture with the tail end of the pack projecting from the skin incision at the most dependent position.

When the muscles of mastication are involved with squamous cell epithelioma, irradiation often is not particularly effective. We believe that here excision methods are indicated primarily if a cure is sincerely to be tried for. By cutting across the ramus above the midportion, the infiltrated tissue may be removed en bloc with some chance of a cure resulting.

Resection or Destruction of a Lengthwise Part of the Mandible.—A malignant growth lying adjacent or attached to the jaw bone usually arises from a

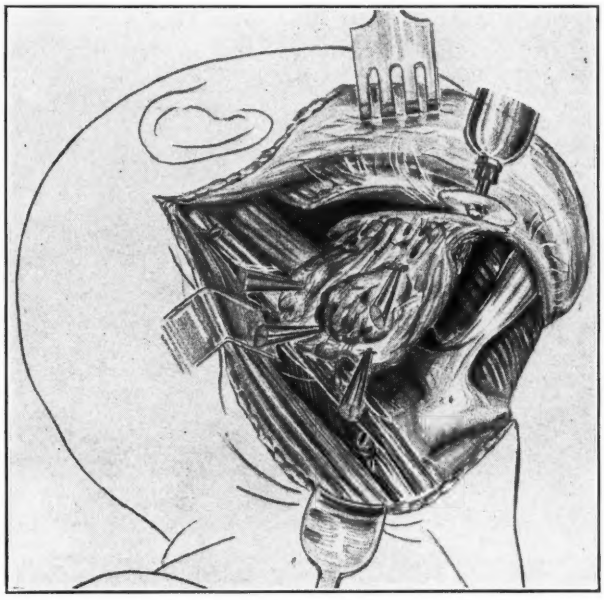


Fig. 6.—Operation on the maxilla for cancer. Diagram showing removal of the upper deep cervical glands and tissues of the submaxillary triangle along with a lengthwise segment of the mandible en bloc.

local lesion in the floor of the mouth, from the lip or from a malignant gland in the submaxillary or the submental region. (Fig. 5 *A* and *B*.) Many times sufficient bone may be destroyed to accomplish one's purpose without actually removing a whole segment of the mandible. Under such conditions a satisfactory destructive procedure with less mortality than the resection of a portion of the mandible, is to burn the diseased bone thoroughly with a soldering iron, killing the greater part of the thickness of it. Later the sequestrum separates and can be removed leaving a jaw which in most instances will have laid down enough bone to prevent a fracture of the bone.

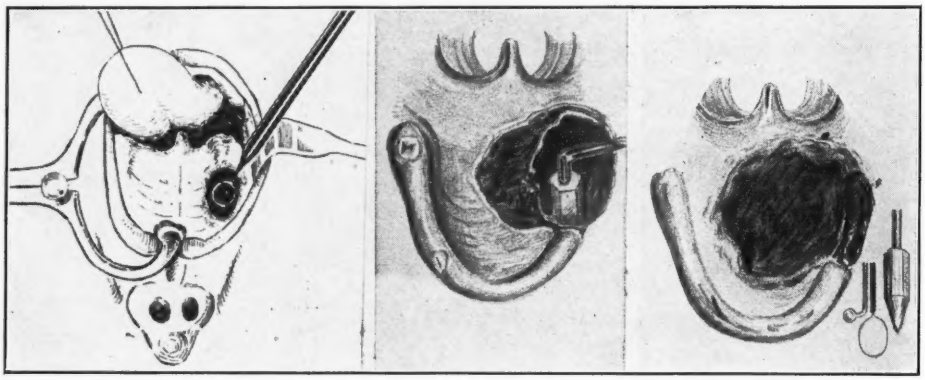
Not uncommonly one sees a carcinomatous node in the submaxillary region which, although the mass is more or less attached to the mandible, is not fixed to the adjacent soft tissue. In such a situation a satisfactory operation is an upper

cervical and submaxillary triangle neck dissection along with the removal of a lengthwise segment of the mandible—all en bloc (Fig. 6). The lengthwise segment of the mandible is cut with an electric saw, and more of the undersurface is removed than the outer surface. The wound heals per primum in contradistinction to the use of the cautery for the same essential purpose.

One must be aware, however, in planning these procedures that malignant cells in bone always go a greater distance in the canaliculi of the bone than one would suspect. The destruction or excision must be sufficient or one had better not do these operations. Properly performed they have a distinct place in the treatment of malignant disease, as irradiation in doses not sufficient to cause radiation necrosis of bone seldom cures any but the most radiosensitive lesions after they have involved the bone.

OPERATION ON THE MAXILLA FOR CANCER

The following operations may be indicated when cancer involves some part of the upper jaw: (a) cautery or endothermic enucleation of the antrum; (b)



A. *B.* *C.*

Fig. 7.—*A*, Diagram showing the use of the endothermic loop to remove malignant tissue. *B*, Diagram of method of entering the antrum and thoroughly cauterizing from the inside. This diagram shows a soldering iron used as the destructive agent, but at the present time the endothermic loop is used for this purpose. *C*, Diagram of method of using the endothermic loop or actual cautery if needs be to remove a malignant lesion of the alveolar ridge and palate. The palatal bone and the alveolar bone are cauterized until destroyed.

partial resection and cautery destruction of the superior alveolar ridge; and (c) partial resection and cautery destruction of the palate and alveolar process.

Resections and excisions of the maxilla as formerly practiced have almost become operations of the past. Resections of the maxilla alone have in the past given almost uniformly bad results so far as final eradication of the usual epithelial malignancies in this region are concerned. At the present time, however, one well-known radium institution treats epitheliomas of the maxilla by resection and application of radium in the cavity which remains.

Cautery or Endothermic Enucleation of Antral Carcinoma.—The cautery for opening the antrum was first used by Larson in 1872. New in 1920 revived the method. At present the endothermic button or loop is used on the same principle; namely, to gain access, to destroy as much of the growth as possible, and to give subsequent drainage (Fig. 7 *A* and *B*).

Previously under radiation therapy of carcinoma of the superior maxilla when discussing "access surgery" a description was given of the method of largely enucleating the central tumor, by cautery or endothermic electrode to give adequate drainage and central exposure of the antrum so that radium can be applied to the midportion of the tumor area. This is the present-day procedure in most clinics for the treatment of carcinoma of the maxilla.

Resection and Cauterization of the Alveolar Process and Palatal Plate.—As noted previously, epithelioma involving bone does not, as a rule, react favorably to radium therapy. Therefore, primarily often it is wiser to place main reliance on methods of excision and destruction when an adult squamous cell epithelioma involves the alveolar ridges or the plates of the hard palate. When present, a tooth in front of or behind the section to be removed or destroyed is pulled. The mucoperiosteum along the lines of the proposed excision or destruction is incised to the bone (Fig. 7 *C*). Often partial resection facilitates the destructive procedure. If this is the case, the extremities of the part of the alveolar process to be excised are cut through by placing the edge of a thin chisel across the lower border and cutting directly upward to the depth of the base of the proposed excision. The chisel is then placed against the upper outer surface of the portion of bone to be excised, and a horizontal cut is made. With bone forceps the block is grasped and twisted out. Considerable bleeding will be encountered, but the operation should be only a short one. The hemorrhage can be controlled by immediately turning on the coagulating diathermic current.

Very often when one wishes to destroy the alveolus and a piece of the jaw bone beneath, one does not need to resect any of the bone. After removing all the soft carcinomatous tissue with the diathermic loop so that only the involved bone is laid bare, the diathermic needle is plunged into the involved bone in first one direction and then another until the blood supply to the area of bone one wishes to destroy has been completely and thoroughly cut off. If doubt remains concerning this latter occurrence, the small hot soldering iron is used. Although the soldering iron is not nearly so graceful to use as the coagulation diathermic electrode, it is an effective weapon for the purpose of completely and totally destroying the involved bone.

When the palatal plate is involved along with or separately, the soft part of the neoplasm is removed with the diathermic loop, after which the involved bone is destroyed with the coagulating current.

After such procedures the dead bone separates from the live at the end of about two months. The sequestrum then is simply pulled away from its granulation tissue base with some rongeurlike instrument, provided it does not separate previously spontaneously.

OPERATIONS ON THE NASO-, MESO-, AND HYPOPHARYNGEAL REGIONS

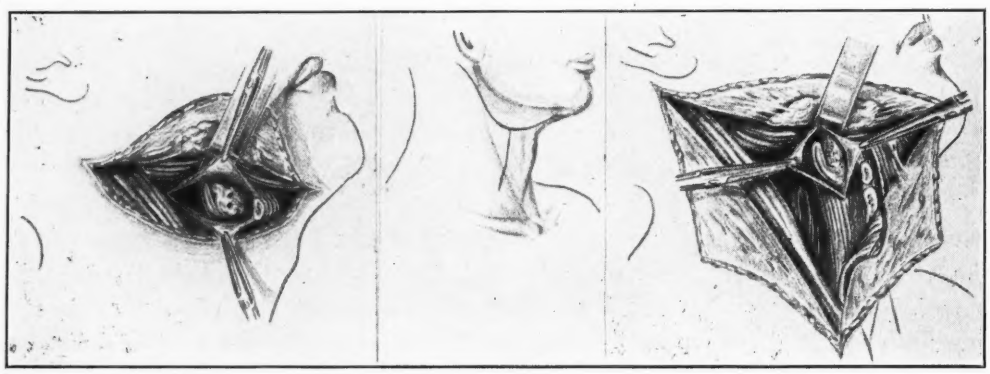
Nasopharynx.—During the past five years no cases in which it was considered that excision of a nasopharyngeal epithelioma was indicated have presented themselves to us.

Mesopharynx.—Occasionally one sees an early epithelioma of the pillar region or the buccopharynx in which it is possible to excise adequately the local lesion through the mouth. In certain instances the splitting of one cheek

is to be advised, but usually this is not found necessary. When the lesion is large enough to make this necessary, a lateral pharyngotomy is usually the only adequate way of gaining the required exposure. The mesopharynx also can be entered from beneath, the angle of the mandible retracted upward and the tongue pulled downward. Usually, however, lateral pharyngotomy is the operation to be recommended to gain this exposure.

Hypopharynx.—Under "access surgery" we have previously described a method of approach for the application of radium to lesions in this area when considered of sufficient extent to make surgical excision inadvisable.

Before deciding on an operative approach either for purposes of excision or for purposes of applying radium, one should determine that the patient is a good risk, the lesion should be limited, and it should be known to be an adult squamous cell epithelioma. If glands are present, they should be movable and present only on the side of the lesion, and the mobility of the tongue should be good. Thus it is seen that the indications for these approaches are not ones of very common occurrence.



A. *B.* *C.*

Fig. 8.—*A*, Diagram of transhyoid approach to the pharynx. *B*, Diagram of incisions used in lateral pharyngotomy. *C*, Diagram of lateral pharyngotomy after removal of the thyroid cartilage and the greater cornu of the hyoid.

Provided that one has determined to expose a lesion in the hypopharyngeal region for therapy, the operator has two choices—if the lesion can be excised to remove it in toto or, if it cannot be excised, to trust to the application of radium after "surgery of access." After the operative approach if the lesion is operable, the risk is only slightly greater if one excises the lesion in toto than if radium only is applied. Therefore in operable lesions primary dependence is to be placed on methods of excision.

The Approach.—When the growth is localized to the vallecula and the epiglottis, a transhyoid approach is indicated (Fig. 8 *A*). When the lesion encroaches upon the lateral pharyngeal wall and spreads posteriorly to the pyriform fossa, a better approach is lateral pharyngotomy. As a rule, a preliminary tracheotomy is advisable as a part of the operation of transhyoid pharyngotomy and lateral pharyngotomy.

Lateral Pharyngotomy. Some Postoperative Complications.—Removal of the epiglottis and a part of the base of the tongue abolishes swallowing for several weeks. During the interval the patient must be fed with a nasal tube or

esophageal tube. The operation to be described for the removal of upper and lateral growths of this region needs only a small plastic operation later to gain closure. Removal of the edges of the epiglottis, the aryepiglottic fold and the anterior oral cartilage will allow almost complete recovery of the voice save a huskiness. When the epithelium over the cricoid cartilage is removed and most of the posterior part of the cricoid cartilage, a skin flap has to be turned in to aid in lining the pharynx. In most instances when the growth is extensive enough to require a skin flap to be thrown into the pharynx, the local growth had best be exposed and implanted with radium. Early growths in the aryepiglottic fold or the pyriform fossa and in the lateral wall offer a fair prognosis for cure. The most favorable location is in the lateral wall.

Transhyoid Pharyngotomy.—An incision is made transversely at the level of the hyoid bone extending from the anterior border of the sternomastoid muscle to the midline and upward to the submental region (Fig. 8 *A*). The mylohyoid and infrahyoid muscles are exposed and detached from the hyoid bone. The hyoid is freed posteriorly and rotated medially. At the juncture of the greater cornu with the body, the bone is sectioned. The greater cornu is removed. The pharyngeal wall is incised, and the edges are retracted. Now one may view the epiglottis, the base of the tongue, and the lesion. It may be excised if this is considered feasible. If not, radium needles are inserted under direct vision. In either case the wound in the pharynx is lightly packed and the skin incision partially closed.

Transthyroid Pharyngotomy.—Trotter advises the transthyroid route (Fig. 8 *B, C*) because the pharynx is shielded from access laterally by the laryngeal skeleton (the thyroid ala, the great cornu of the hyoid and the thyrohyoid ligament connecting them posteriorly). These structures can be removed without entering the wall of the pharynx or disturbing any growth within the pharynx. After removal of these cartilages, the tumor can be palpated and an estimation of its extent and situation made. The point to make the pharyngeal wall incision can be judged. Because of the extent, if one deems it wise to apply radium by this exposure, the application can be accurately made. The incision is made downward from a point just behind the angle of the jaw, 4 or 5 inches, and is made nearly vertical to the sternomastoid. Two incisions are advised depending upon whether or not a simple pharyngotomy is anticipated without neck dissection or whether a neck dissection is also considered advisable at the time of the pharyngotomy. When the neck dissection is not to be made, the incision made is one inch forward and parallel with the one first described. When the gland dissection is to be done at the lower end of the wound, the anterior edge of the sternomastoid muscle is cut transversely and the whole muscle retracted backward. The usual neck dissection is then performed without removing the sternomastoid muscle, removing the jugular vein but not, as a rule, the submaxillary gland. The superior thyroid artery is ligated well away from the carotid. The sternomastoid muscle is now stitched down over the carotid vessels and sutured to the paravertebral muscles with catgut. The deeper neck structures by this method are fairly well closed off. A drain may be placed through a puncture behind the sternomastoid muscle.

Some men would prefer to remove the sternomastoid muscle as in a complete bloc neck dissection. Undoubtedly this is the most efficient operation for the removal of involved glands. But unless the patient is a particularly good risk, a complete neck dissection en bloc and a lateral pharyngotomy at one sitting are likely to be too much surgery. In most instances two operations will be wiser if one feels that if the sternomastoid muscle is not removed, the excision of the gland would be inadequate.

Between this anterior and the posterior borders of the larynx a vertical incision is made down to the cartilage. The thyroid alae and the greater cornu of the hyoid are exposed. The superior laryngeal vessels and nerves are divided. The greater cornu of the hyoid and the thyroid cartilage are separated from the pharyngeal wall. When the growth has involved the thyroid cartilage, the alae of the thyroid cartilage should be removed en bloc with the growth. When the

A. *B.*

Fig. 9.—*A*, Photograph of patient after removal of the lateral pharyngeal wall, one-half of the tongue, and one-half of the palate. Showing feeding tube in place. This patient lived four and one-half years after this operation and then died after being run over by an automobile. No recurrence at the time of death. After this photograph was taken, the defect in the cheek was repaired by using a flap from the neck for a lining and a flap from the forehead for a covering.

B, Photograph of patient after resection of mandible involved with a carcinoma of the parotid gland. Patient living after five years.

pharynx is free from the thyroid alae, it is divided vertically at the juncture of the anterior and middle thirds, and the alae are removed along with the thyrohyoid ligament and the great cornu of the hyoid bone freely exposing the lateral pharynx. The pharynx is opened in such a manner that one does not cut too near or through the tumor. As soon as the pharynx is opened, the glottis is packed after cocainization. The growth is now removed, cauterized or needled with radium needles as thought advisable. Usually immediate closure is done. The incision in the pharyngeal wall is reinforced by bringing together the muscular flaps that have been turned off of the pharynx and off of the ala of the thyroid cartilage. The skin incision is closed loosely with drains. In favor-

able cases no leakage occurs. When the pharynx cannot be closed, it is advisable to suture the pharyngeal mucosa to the skin mucosa to prevent neck infection. Later after three or four weeks, a plastic operation is done to close the pharyngostome.

CONCLUSION

Finally, after the perusal of the operations deemed advisable and useful at the present time for adult epitheliomatous lesions in and about the oral cavity, it is probably unnecessary to point out the influence that methods of irradiation have had upon the surgery of this region.

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SURGICAL CARE OF INJURIES AND DEFORMITIES OF THE NOSE, LIP AND PREMAXILLA

With Report of Cases

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ONE of the most noticeable deformities and anatomic defects that are offensive to the eye is a malformation of the nose and dentofacial area.

An injury, such as a blow or a fall, is probably the most significant cause of altering the position and shape of the nose, as well as impairing free and easy nasal breathing, besides, as it may frequently happen, one or more anterior teeth are lost or broken beyond dental repair.

Children are prone to injuries of the nose while playing. Even though the injury may appear slight, and the symptoms only a slight hemorrhage, parents should not be negligent in having the child's nose examined by the physician to ascertain the degree of damage. If the injury should involve the anterior teeth, dental examination is imperative, because such injuries if not properly cared for may result in a progressive malocclusion and dentofacial deformity.

Malposition of the nasal structures though slight in childhood, if not treated, has an important bearing on the development of the nose. The following case is a very striking illustration of a malformed nose brought on by a fall when the patient was a child:

The middle third of the nose was crushed inward causing the septal cartilage to be deflected extensively, and with a fracture of the upper third of the bony structure. It was rather difficult to determine what really happened to the osseous structure of the nose. The humplike appearance on one side was no doubt a displacement of one lateral nasal bone. In this case the protruding bone was cut away, improving the nose considerably in appearance. Further surgical care will be necessary now to correct the deflected septum and to raise the lateral cartilage sufficiently to improve the breathing and appearance. (Figs. 1 and 2.)

The next case is one of a long hanging nose resulting from the improper repair of a harelip when the patient was an infant. This patient had a congenital harelip which was repaired at the age of two weeks by the family physician. The columella was buried within the lip in such a way that the orbicularis muscle had a downward instead of a lateral pull when in function. This caused an abnormal development of the nasal cartilage. The nose tip grew downward, lengthening and deflecting the septum so that the left nasal channel was occluded. The lip was indurated, short, and undeveloped. (Fig.

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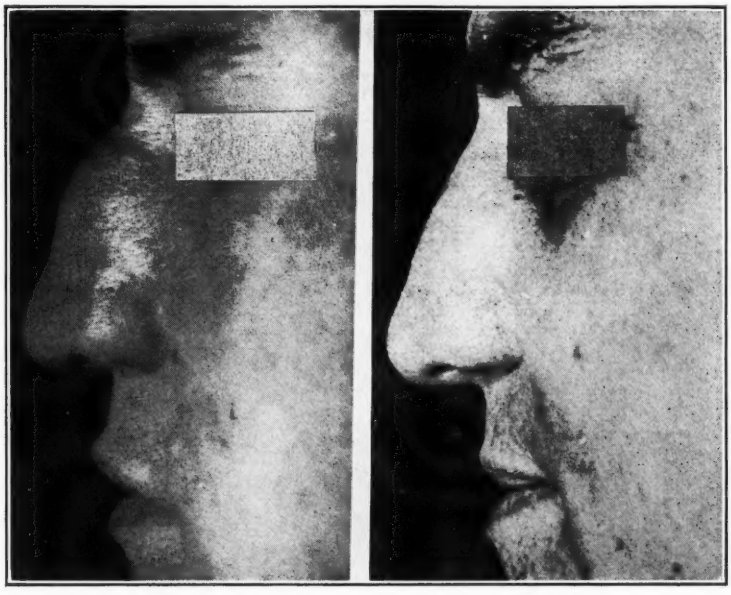

Fig. 1. Fig. 2.

Fig. 1.—Humplike appearance of the nasal bones and a slight depression of the cartilaginous area. The left nostril was occluded on account of the pronounced deflection of the cartilaginous septum.

Fig. 2.—Showing improved condition of nose, which was done by excising the soft structures on the outside and cutting away the protruding part of the overlying lateral nasal bone. If the operation is well planned and the suturing done carefully, there is no noticeable scar.

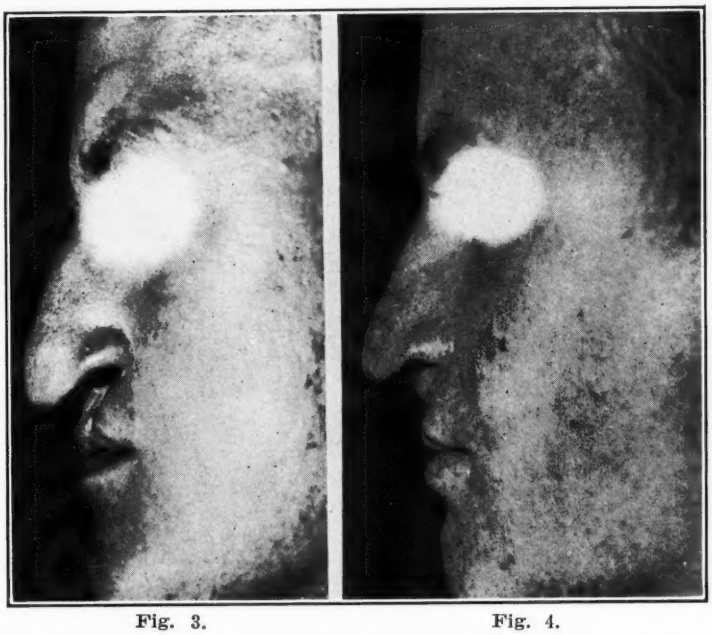

Fig. 3. Fig. 4.

Fig. 3.—Long hanging nose tip reconstructed according to the operation of Joseph by removing a wedge-shaped piece of septal cartilage, and reconstructing the columella and lip.

Fig. 4.—Result of the operation after the nose was shortened and the columella and lip were reconstructed. There is still considerable fullness in the nasal-labial area which I hesitated to remove for fear that it would cause the nose to appear longer.

3.) The patient was eager to undergo operative care so that his breathing would be free and natural, his nose shortened and the lip reconstructed so that the nasodentofacial area would have a more harmonious relationship to his face. The lip was divided by an incision through the remaining scar extending from the floor of the left nostril through the vermilion border. The septum could then be freely examined. The deflection was extreme. A submucous resection corrected this condition.

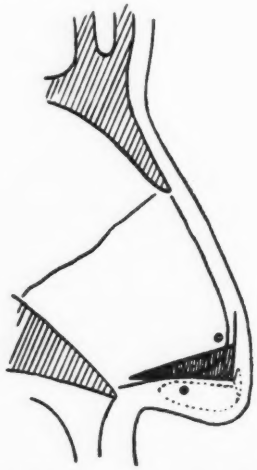

Fig. 5.—Wedge-shaped excision for raising the tip of the nose according to Joseph.

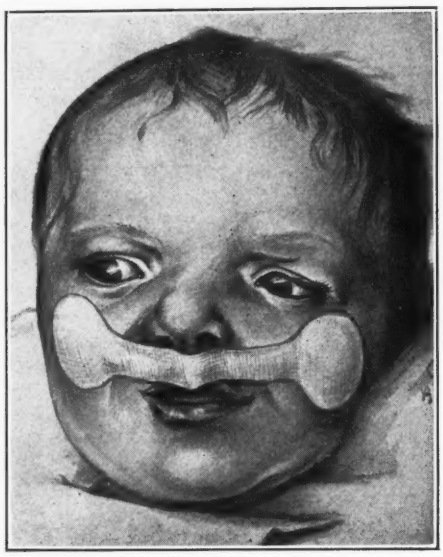

Fig. 6.—A schematic drawing to illustrate the adhesive strapping of the lip and over the protruding premaxilla. Constant tension when skillfully attended to for six weeks or longer will mold the premaxilla into correct position so that the surgical repair facilitates the operator in obtaining a better result.

In order to move the tip of the nose upward, I resected a wedge-shaped piece of quadrilateral cartilage with the pericondrium as is illustrated in Fig. 5. The size of the wedge depends on the degree of the hanging nose tip. The triangular opening is closed by uniting the wound edges with sutures on both sides, and strapping the nose tip in position during the healing period.

If the operation is well planned, the nose tip should be in correct position. If, however, the columella is too short, then it is necessary as it was in this case to lengthen it by making lateral incisions on each side through the lip in order to obtain sufficient tissue to reconstruct the columella. The lip was then reconstructed and repaired. (Fig. 4.)

Bilateral harelip complicated by a protruding premaxillary bone and a double alveolar cleft is usually a very difficult deformity to correct in order to obtain a normal relationship of the incisors when they erupt. The usual procedure when operating is to remove a V-shaped piece from the vomer or

Fig. 7. Fig. 8.

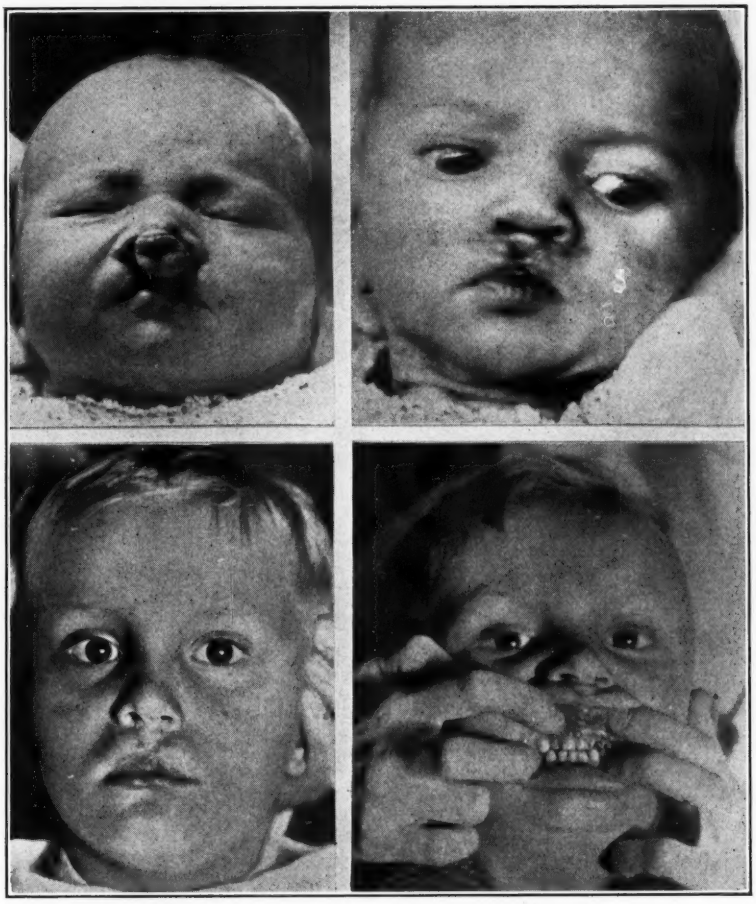

Fig. 9. Fig. 10.

Fig. 7.—Complete bilateral harelip, double alveolar cleft and protruding premaxilla. Tension applied with adhesive tape over the premaxilla had a tendency to narrow the alveolar cleft and force the premaxillary bone backward.

Fig. 8.—Showing the child ten days after the operation. One year later the palatal cleft was closed. I did not see the patient again until he was six years old. Notice the result in Figs. 9 and 10.

Fig. 9.—Scars on the lip are noticeable, and should be excised and a plastic repair done to obliterate this skin defect.

Fig. 10.—Showing the excellent relation of the teeth.

make an oblique incision into the vomer, and carry the prominent premaxillary bone backward into position, then freshen the borders and suture. This method of operating does not fulfill the results one expects, as the premaxilla is usually tilted downward and inward. When this happens, the incisors

erupt lingually, and there is a decided displacement of the upper lip. This condition will become progressively worse during the growth of the child. I have operated on a number of cases following the technic as recommended by other writers and authorities on cleft palate surgery, and in none of these cases was the result satisfactory especially when the patient had fully grown. All these patients had to be given further orthodontic and surgical care.

Fig. 11. Fig. 12.

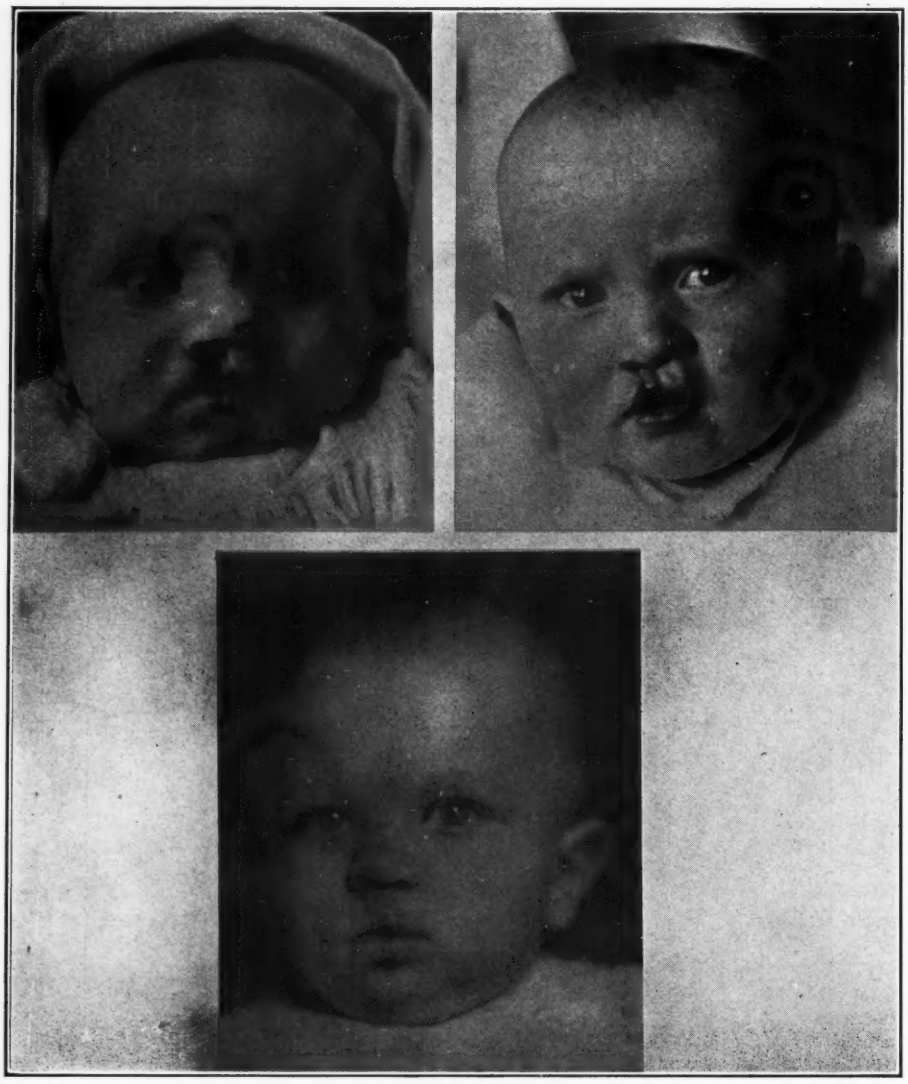

Fig. 13.

Fig. 11.—Complete harelip and cleft palate with a shifting of the nose to one side, and protruding left alveolar structure. This child was firmly strapped for four months, resulting in a narrowing of the cleft.

Fig. 12.—Result from strapping the lip.

Fig. 13.—Showing the normal relation of the nose and lip after the operation. The palatal cleft was also closed.

I now do a high and complete submucous splitting of the cartilaginous septum back of the protruding premaxillary bone and columella. Then for several weeks, tension is applied to the protruding premaxilla with adhesive

straps. (Fig. 6.) This force permits the protruding premaxilla to drift bodily backward until the borders of the alveolar cleft come in contact. The borders are then denuded and united. This operative procedure does not disturb the tooth buds and permits normal eruption with complete bony union of the premaxilla and maxilla. (Figs. 7-10.)

Strapping the lip from six weeks to two months or longer shortly after birth is a very promising and effective method of narrowing an alveolar cleft. If this is done properly, and the adhesive tape held firmly in place, the split

Fig. 14. Fig. 15.

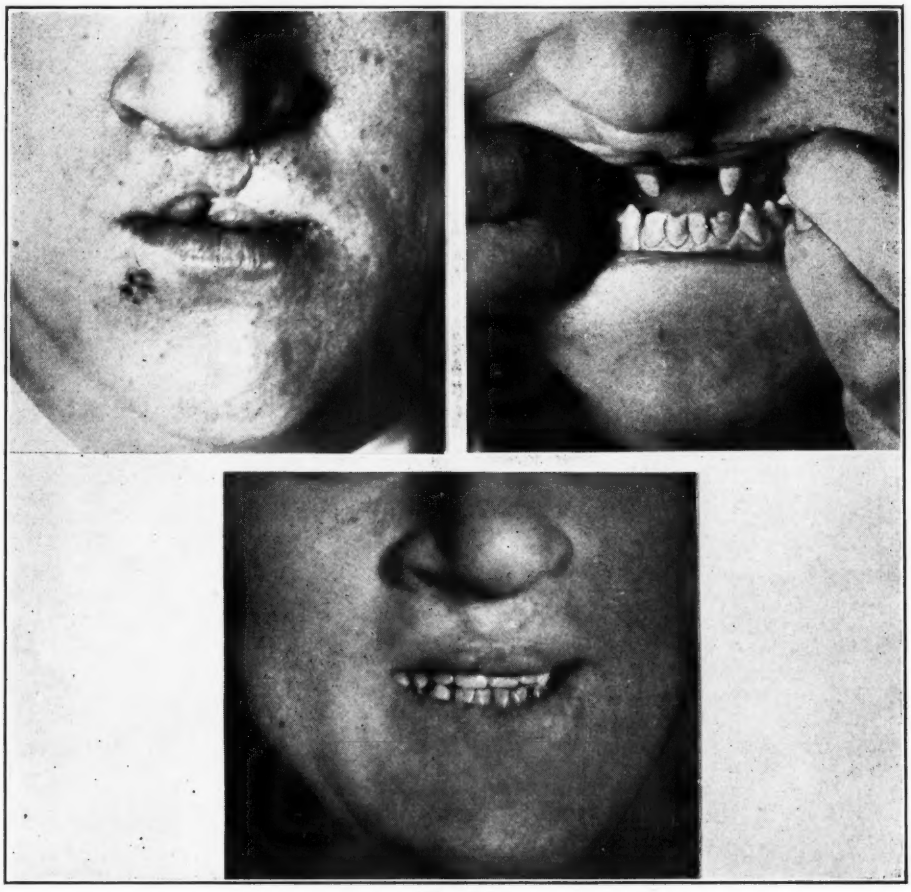

Fig. 16.

Fig. 14.—Malformed lip following surgical care.

Fig. 15.—Contracted upper arch. The premaxilla was buried in the left nasal channel.

Fig. 16.—Showing the case completed. The hard and soft palates are closed, lip repaired, and the patient wears a so-called artificial premaxilla to which are attached the anterior teeth.

lip when in function will mold the maxilla so that in most cases the alveolar cleft will become sufficiently narrow so that the borders will come in contact. I find this preoperative procedure a great help in repairing a lip and alveolar cleft. The following case demonstrates the result achieved by this method.

This child had a complete single cleft of the lip and palate with a shifting of the lower third of the nose to the left, and the left alveolar border was protruding (Fig. 11). After several months of strapping, the alveolar cleft

not only became narrower, but the nose became straight (Fig. 12). I then operated on this child and closed the alveolar and palatal clefts, and several weeks later I closed the harelip (Fig. 13).

If the premaxilla is not placed in correct position, and the lip cleft closed, a serious deformity may develop after the patient grows older. This happened in the following case.

The patient had a congenital double harelip complicated by a bilateral alveolar cleft and a complete cleft of the hard and soft palate, and a protruding premaxilla. When an infant, he was operated on and the lip cleft closed. Nothing further was done until he was eighteen years of age. He then came to me for further care. The undeveloped premaxillary bone was a floating mass deeply embedded within the left nostril and two central incisors were

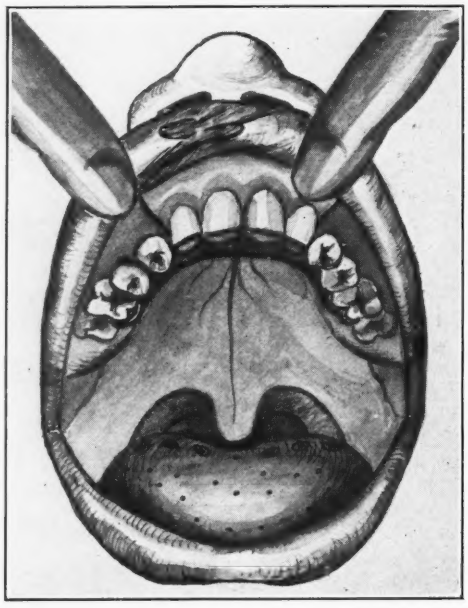

Fig. 17.—A schematic drawing showing the prosthetic restoration of the anterior teeth.

erupting within the nasal cavity. This faulty position of the premaxillary bone and erupting teeth hindered the free flow of the nasal secretions. There were considerable inflammatory changes with ulcerations in that area. The lip was stiff, indurated, malformed and contracted with excessive scar tissue. The vermilion border was notched. The maxillary dental arch was considerably contracted. (Figs 14 and 15.)

Since this patient had a pronounced palatal cleft and a dentofacial deformity, it was necessary to resort to surgical, orthodontic, and prosthetic care. The first operation consisted in closing the hard and soft palates. Six months later the patient was operated on for the complete removal of the premaxillary bone. This was done by dividing the lip through the line of the former cleft, removing the scar tissue, and separating the soft structure from the bony attachment of the deeply embedded premaxillary bone. This gave free access to the nasal cavity through which the undeveloped premaxilla

was separated from the vomer and removed. Plastic repair was then done on the lip. No attempt was made to close the opening left by the removal of the premaxilla. The patient was then put under orthodontic care in order to widen the dental arch especially in the region of the canines. After this was done the case was ready for prosthetic care. This was the final step to complete the case and to give fullness to the premaxillary region after the artificial denture had been inserted in order to establish improved dentofacial harmony. (Figs. 16 and 17.)

Fig. 18. Fig. 19.

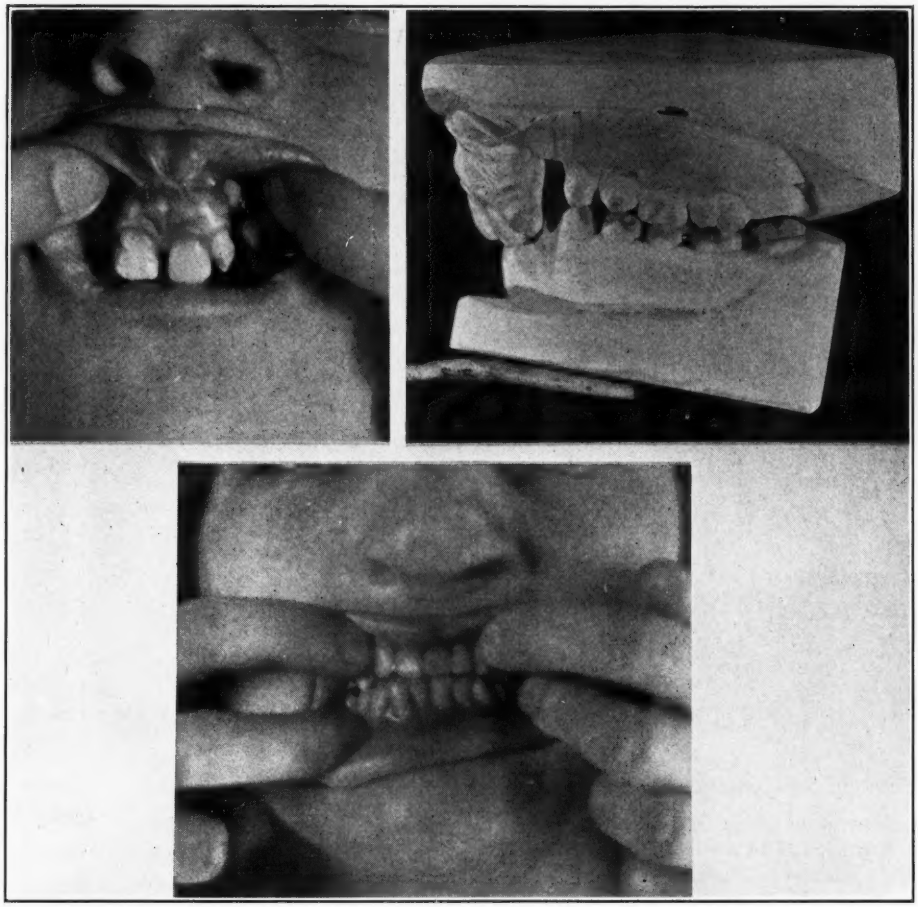

Fig. 20.

Fig. 18.—Showing the long hanging premaxilla with two central incisors and a lateral incisor, and a complete bilateral alveolar cleft. The lip had been repaired when the patient was a baby, with good result. The premaxilla with the teeth was removed, and the overlyng soft structures were utilized to close the opening.

Fig. 19.—A plaster cast showing the long hanging premaxilla.

Fig. 20.—Showing the prosthetic restoration after the premaxilla had been removed and the alveolar cleft closed.

A double alveolar cleft should always be considered seriously before attempting to repair a double harelip. If the premaxilla is not united with the maxilla, it remains a floating mass. This is illustrated in Figs. 18 and 19. In this case the teeth had erupted, that is two central incisors and the left lateral incisor—the right lateral incisor was missing. In order to close the

opening, that is the bilateral alveolar cleft, I stripped the mucoperiosteal tissue free from the premaxilla and removed the bone with the teeth. I then utilized the soft structures to close the gap. Fortunately, the patient had canines which were well developed. Since these teeth were in excellent condition, three-quarter crowns were attached to them and a bridge was inserted as is illustrated in Fig. 20. The lip had been operated on when she was a baby, and the result was excellent so there was no need for any further plastic repair.

If the premaxilla should be removed, then there is a sagging of the upper lip and the lower lip appears to protrude. Fig. 21 shows a case in which the patient had a congenital protruding premaxilla with a bilateral alveolar and lip cleft. This patient was operated on several times without success. The

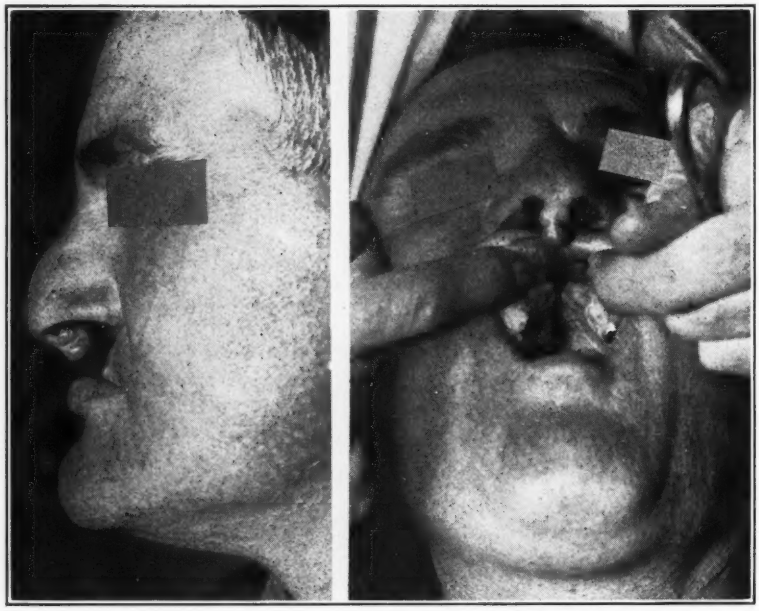

Fig. 21. Fig. 22.

Fig. 21.—Deformity following the removal of the premaxilla. Notice the hanging columella. The lip is very much indurated and stiff. The patient refused to be operated on because of the experience he had had in undergoing a number of operations without success.

Fig. 22.—Same patient as shown in Fig. 21. Notice the narrow cleft of the hard palate.

surgeon finally removed the premaxilla and closed the lip. Notice the hanging columella. Because of the loss of the premaxilla without prosthetic restoration, there is considerable retraction of the lip. Fig. 22 is the same case, showing that there is still a narrow cleft of the hard palate. Since this patient had been operated on a number of times without result, he refused further operative care. What is necessary in this case is to reconstruct the columella and reoperate on the lip, close the palatal cleft and then insert a dental prosthesis.

The removal of a premaxilla in infancy should not be tolerated. If the operation is well planned and performed skillfully, one can obtain excellent results as is illustrated in Fig. 10.

A tumorlike growth of the cutaneous surface of the nose tip may be considered a hypertrophic stage of the skin involved. This is usually preceded by acne rosacea. The growth involves the lower one-half of the nose, especially the tip and both alae where under normal conditions there are large sebaceous glands. The mass is usually multilobular, pitted, furrowed and coursed by many dilated and tortuous capillary and small venous branches causing the tumor to be very hyperemic and bluish red or livid in color. Occasionally minute areas of necrosis may form, probably caused by the pressure from the cystic enlargement of the sebaceous glands.

The growth is very disfiguring and repulsive in appearance so that the patient is reluctant to appear in public. Various descriptive terms have been applied to the growth, such as hammer nose, whisky nose, double nose, ball nose, nodular nose; and as an underlying tissue formation a cyst adenoma, an adenofibroma or an acne hyperplastica was claimed.

The real inciting cause of the deformity is unknown. Fuld considers the pathologic changes that form the growth into these stages: first stage, a simple venous engorgement; second stage, the veins and the capillaries permanently enlarged; third stage, an enormous hyperplasia of the connective tissue elements of the skin, and the sebaceous glands are so enlarged that the nose presents a honeycombed and unsightly appearance.

Grattin believes that because of the persistent hyperemia the vessels become permanently enlarged. A hypernutrition of the skin results. The sebaceous glands hypertrophy first as gelatinous nodules, later becoming fibrous. The markedly hypertrophic forms are due to new connective tissue growth amounting to a real hyperplasia.

Hanrahan reports that the disease is a mild chronic inflammatory reaction brought about by the accumulation of large quantities of sebum in dilated and hypertrophied glands.

Histopathology of Rhinophyma.—From a histopathologic point of view, the rhinophyma is characterized by the presence of hypertrophic and hyperplastic processes accompanied by inflammatory reactions or changes of the interstitial tissue.

In many instances the rhinophyma is preceded by the acne rosacea stage, in which one may observe definite circulatory disturbances in the affected tissues with the appearance of cutaneous nodular formations and development of telangiectatic areas. By some dermohistologists these changes are considered as an incipient or first stage of rhinophyma.

CASE REPORT

The following is a report of a case that I operated on at the Marquette University Hospital. C. K., aged sixty-two years, laborer, said that he had frozen his nose five years before. The nose began to enlarge after that, and continued to grow in size. (Fig. 23.) Under ether anesthesia, an incision was made over the tumor in order to obtain a flap of skin sufficient in size to be used as a covering over the raw surface after the removal of the growth.

The tumor with remaining skin was then cut free from the underlying cartilaginous frame of the nose. The fibrous tissue in the tumor made dis-

section rather difficult. When the ducts of the glands were cut, there was a thick cheesy sebaceous material oozing freely. The bleeding was very profuse but easily controlled after the mass was cut away.

On each side of the nose there was an extra lobelike formation, which was removed with the large mass attached to the tip. Care was maintained to preserve the skin which joined the mucous membrane on each side of the alae. This is important in order to prevent scar formation and to hasten healing. After the removal of the mass and trimming away of any remaining part of the tumor, until the desired and natural shape of the nose was obtained, the flaps of skin which were previously preserved were placed over the raw surface and the edges trimmed to conform to the nose and to form edge-to-edge contact. The healing was remarkably rapid without any complications. The

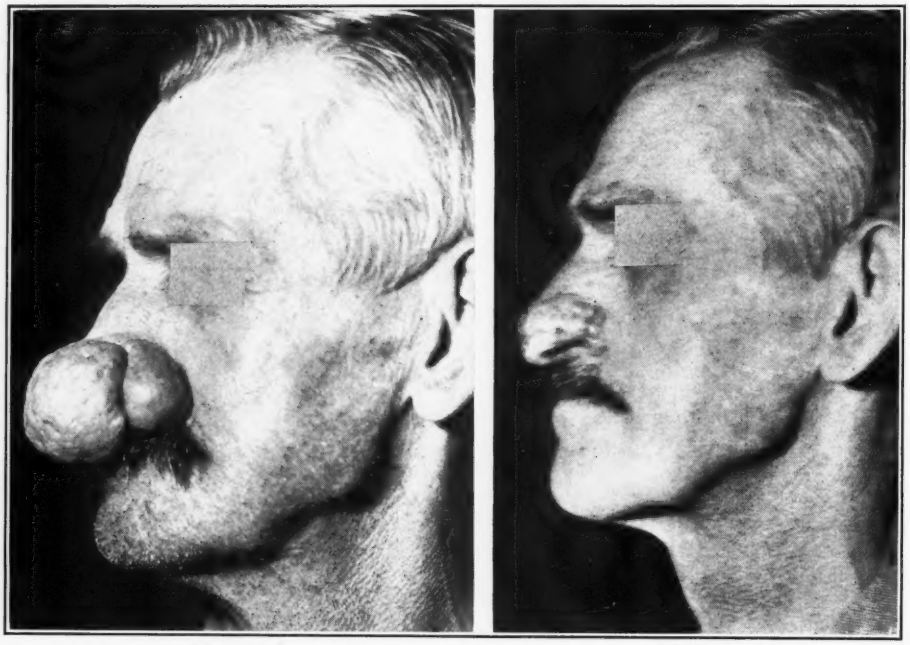

Fig. 23. Fig. 24.

Fig. 23.—Left side of tumor showing extra lobelike formation.
Fig. 24.—Side view seventh day after removal of growth.

patient left the hospital the seventh day after the operation. On the fourteenth day healing was complete (Fig. 24).

The treatment of rhinophyma is its surgical removal which, whenever necessary, should immediately be followed by rhinoplastic procedures. The cosmetic result in this case was an excellent one; the disfiguring effect has disappeared.

Pathologic Fndings.—Specimen consists of a pear-shaped piece of tissue with two small projecting auricles, one on each side of its narrowed portion. Externally it has a skin covering, whereas the underlying aspect displays a connective tissue formation. The skin surface exhibits minute craterlike formations or depressions.

The specimen measures 64 mm. × 52 mm. × 31 mm., the thick dimension being somewhat below the central portion. The tissue throughout possesses firm consistency (Fig. 25).

Fig. 25.—Specimen after removal. Note the projecting growths on each side.

Fig. 26.—Note varying thicknesses of fibrous septums.

Microscopic Description.—There are numerous small and large islands consisting of somewhat large, light-stained cells, the type commonly found in sebaceous glands. These cellular islands are separated from each other by fibrous septums of varying thickness. Blood vessels in moderate abundance

can be seen traversing in these septums. Whenever the septums come together, they contain a diffuse lymphocytic infiltration. The islands stand out to a very marked degree. The proton plasmatic outlines of each cell are clearly evident; the cells are large, flat, and polyhedral in shape. The cytoplasm stains lightly and displays a very delicate threadlike network or a spongy appearance. The nuclei are small, round, and stain prominently (Fig. 26).

Diagnosis.—Marked hyperplasia of sebaceous glands with hypersecretion; chronic fibrous interstitial inflammatory reaction (rhinophyma).

A congenital angioma of the skin when involving the lip is very disfiguring and repulsive in appearance. Sometimes these birthmarks develop later a tumorlike growth which may be classified as an angiofibroma. Fig. 27 is a photograph of a patient who had this condition. The birthmark involved

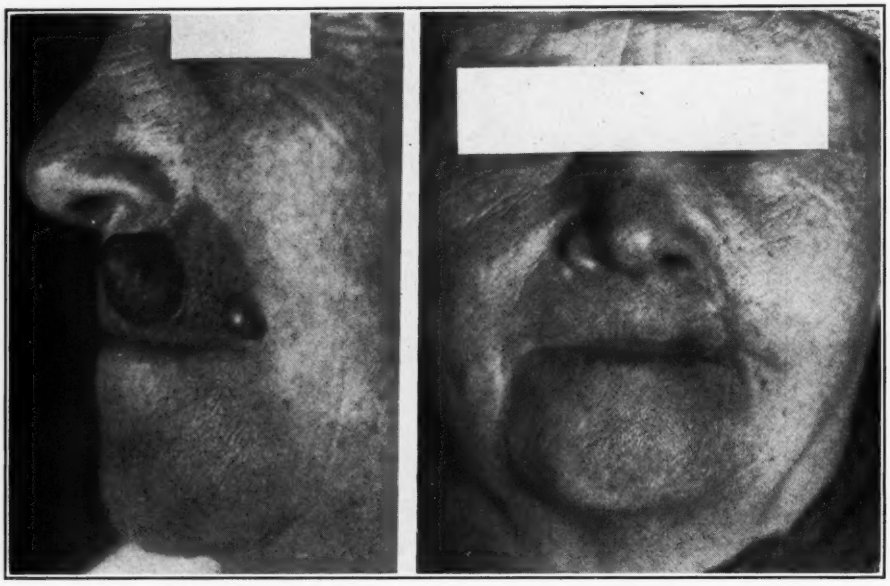

Fig. 27. Fig. 28.

Fig. 27.—Angiofibroma of the left lip. The entire area was completely removed.
Fig. 28.—The result after the removal of the entire birthmark. The scars at the left angle of the mouth are to be excised and repaired by skin sliding.

the left half of the upper lip, and in connection with this blemish on the skin there were two tumors that had developed later in life. This condition is rather superficial, involving the skin only.

There are various methods of treating these cases. Complete surgical removal probably is the most satisfactory way to remove the disfigurement and then a plastic skin repair should be done. In this case, I removed all the tumor and skin blemish, and then widely undermined the skin and stretched it. The result appeared quite satisfactory as is illustrated in Fig. 28.

Various methods may be adopted to repair the lip with skin; but, if the area is not too extensive, skin sliding is probably the quickest method and offers the best result because in doing a transplant there may be a noticeable

difference in the color of the skin. There is still a scar in the left angle of the mouth which can at a later time be excised and further skin sliding done and repair made so that this is not noticeable.

Injuries to the nose and dentofacial area should always be given serious consideration especially during the period of growth. If the operation is well planned at that time and skillfully executed, there is little or no need of further care at a later time. Suturing of the skin should be done very carefully after the torn and distorted parts have been placed in correct anatomic position.

Fig. 29 shows a case in which the nose was badly torn, lacerated and broken. This man was operated on a few hours after the injury. The injury

Fig. 29. Fig. 30.

Fig. 29.—This patient had a very deep laceration and fracture of the nose. The wound was very dirty, and therefore it was thoroughly washed out with hydrogen of peroxide followed by ether. All small loose parts of tissue were trimmed away, and the torn cartilage and fractured nasal bones placed in correct anatomic position and firmly immobilized. Plastic repair was then done on the soft tissues.

Fig. 30.—The result six weeks after the injury. The scars are not noticeable, and the contour of the nose is correct. The patient has no difficulty in breathing.

was caused while he was working in a sewer tunnel winding a cable. The gear wheel broke loose and struck him in the nose, fracturing and crushing the nasal bones and splitting the nose open. The wound was very extensive, reaching from the bridge to the tip, exposing the bone and upper lateral cartilage. The lower left cartilage was also exposed, and not only was it exposed, but was torn partially loose and hanging at the tip. The columella was cut through at its base and torn away from its attachment to the septum. The septum was lacerated and fractured. A part of the left tip was torn, leaving a deep cavity extending into the nasal vestibule in which the lower

lateral cartilage was hanging. There were numerous cuts on the lip. In this case it was necessary to place the cartilage and crushed bones in correct anatomic position and suture the deep lacerations on the inside and outside of the nose; then, by the usual procedure the nose was immobilized and the fractured bones and cartilage were held in position. The result was very gratifying as is illustrated in Fig. 30.

Possibly one of the most important considerations in treating these deep lacerated wounds of the nose, mouth, and face is to avoid deep pockets which will permit the accumulation of blood. It is very essential that all bleeders must be under control, and the wounds carefully sutured without leaving any wrinkling or puckering of the tissues; in other words, avoidance of spaces within the tissues is essential to produce the results one looks for.

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FLAPS AND INCISIONS*

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A VERY prominent surgeon said: "You cannot do good work unless you have good vision." Yet many operators work in awkward positions, never expose the field by making and retracting flaps, and continue to wonder why their patients do not convalesce better or why they were unable to complete the operation satisfactorily.

Many general surgeons have boasted about their small incisions. Some dental surgeons mistakenly believe that trauma is reduced and the operation facilitated by making short incisions. They have not fathomed the full significance of this necessary surgical fundamental.

Correct access to the parts to be operated upon accomplishes many things; good visibility, speed, and thoroughness are a few. Lack of access produces trauma and its many consequences such as hemorrhage, postoperative pain, infections, etc.

The principles of flap design follow:

1. The blood supply or nutrition must be adequate to maintain the health of the flap.

2. Unnecessary tension should not be used to retract the flap. Tension is reduced by locating the incisions correctly and making them sufficiently long to prevent tearing or injury.

3. The design of the flap should provide adequate visibility.

4. When the final apposition of the flap is made, held by sutures or not, its shape must aid rather than interfere with the normal healing processes, i.e., it should be easily held in its correct position. The underlying bone should help to retain the adapted margins.

Flaps made for accessibility should have a pedicle at least as wide as the widest part of the flap. The pedicle should never be insufficient to keep the dissected flap efficiently nourished.

Let us consider the structure and characteristics of the soft tissues of the mouth from a surgical point of view.

Mucous membrane, particularly that covering the external bony processes in the mouth, is very vascular, but extremely thin and easily traumatized.

When incisions are restricted to the gum tissue, the bleeding is slight, and when extended into the cheek or lip folds, the hemorrhage will be greatly increased, but when the flap is finally retracted and held, bleeding usually ceases.

The periosteum is extremely thin and when injured may cause considerable postoperative pain. When attempting to separate this from the bone, it is

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imperative to sever completely the periosteal fibers before attempting to elevate the periosteum. Attention has been drawn to the work of Ollier in his experiences with periosteal flaps. By partially removing a flap of periosteum and inserting it into muscle tissue, he produced a growth of bone within the muscle, directly from what he regarded as the regenerative properties of the periosteum. He was unsuccessful when using a dull instrument in lifting the periosteum by merely pulling it away. With a sharp instrument, however, he produced bone. He had probably included, with the sharp instrument, flakes of bony substance which remained attached to the undersurface of the periosteum. We know that the undersurface of the periosteum contains osteogenetic cells which are semi-imbedded in the matrix and lie just beneath the fibrous layer, and some of these cells were included and resulted in the formation of new bone.

It is necessary then to be careful to sever completely the bundles of periosteal fibers before attempting to lift the flap from its position. Dull knives or incorrectly designed periosteal elevators will tear or so injure the periosteum as to inhibit if not entirely destroy its regenerative properties and so invite postoperative difficulties.

Fig. 1. Fig. 2.

Unquestionably, most every design of incision, as to angle or curvatures, has been used in oral surgery, and it is for each individual to decide which type is most efficient in his practice. The design should be simple, and constant manipulation should be avoided.

INCISIONS FOR DIFFICULT EXTRACTIONS

Considering the design of incisions and flap retraction which may be used for the removal of hypercementosed roots, broken-down teeth, buried roots in the antrum or in other locations, lateral incisions of about 45 degrees to the alveolar ridge are made. They start from the gingival crest and proceed downward to the labial fold, or not, as the case demands. Care is taken to preserve the gingival tissues about the adjacent teeth, a point to be discussed more fully later on.

Fig. 1 shows an incision designed for this purpose with the principles of adequate nutrition, location, length of incisions, good vision, and proper adaptation carefully observed.

A modification which may be used in the extraction of molars (single or adjacent) when exceptionally rapid healing is desired is seen in Fig. 2. The incisions are made parallel to each other, allowing the flap to collapse into the socket or bone cavity after the operation, covering the base of such a cavity

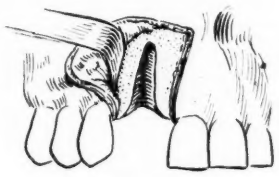


Fig. 3.

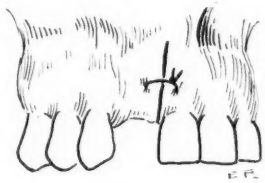


Fig. 4.

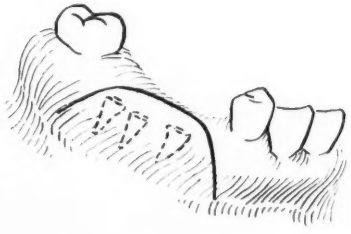


Fig. 5.

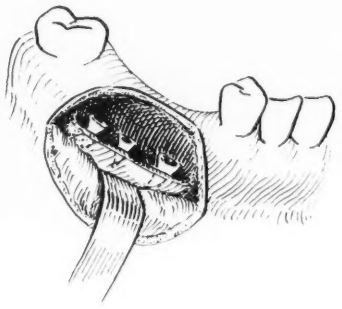


Fig. 6.

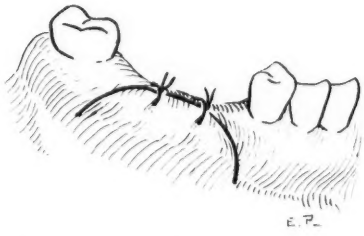


Fig. 7.

and promoting healing by first intention. This principle may also be used in other operations and will be mentioned when we consider cysts. It will undoubtedly hasten the convalescence of a wound to at least half the ordinary healing time.

For the removal of difficult teeth or root tips, some operators prefer to use one incision on the mesial side which may include a distal obtuse angle or not,

as shown in Figs. 3 and 4. I think that for single-rooted teeth this is permissible, but where access to the distal root socket of a molar is necessary, the flap cannot always be retracted without the chance of tearing or stripping the

Fig. 8.

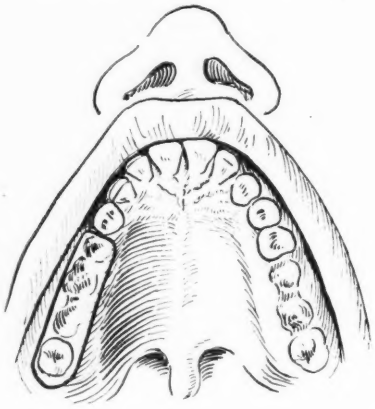


Fig. 9.

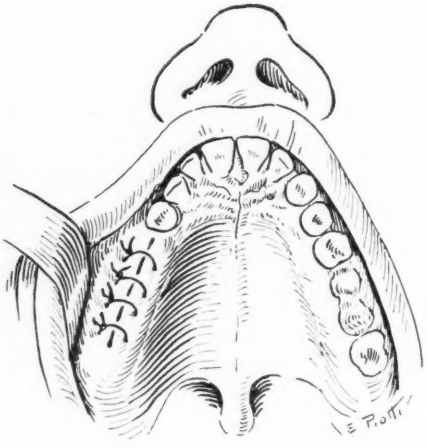
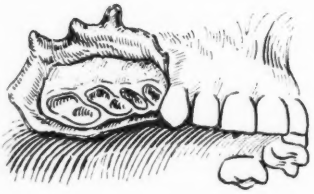


Fig. 10.



gingiva from the adjacent tooth. It may be used on single roots or where access only to a narrow mesiodistal area is needed. If the field of operation is greater than the width of a single root, arc incisions are advised, as shown in Figs. 5-7.

Many times when extraction of a number of adjacent teeth is to be followed by alveolar trimming, incisions as shown in Fig. 8 may be used to advantage. The gingival crests are eliminated by the first incisions which include the buccal and palatal gingiva. The flaps are easily elevated, and the straight edges simplify the final approximation, as shown in Fig. 9.

When the entire gingiva is retracted as shown in Fig. 10, the crests must be trimmed before completing the operation if the wound margins are to be apposed.

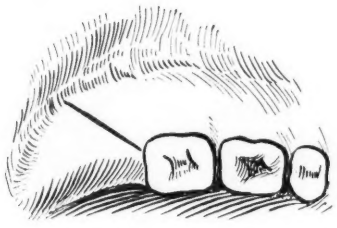


Fig. 11.

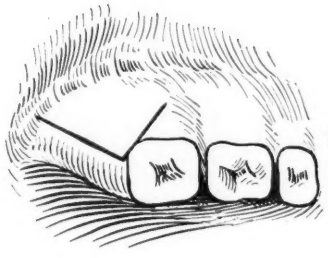


Fig. 12.

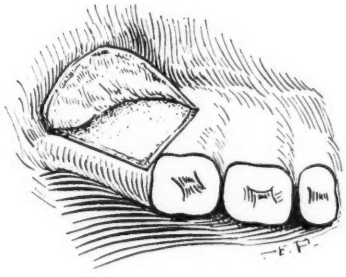


Fig. 13.

INCISIONS FOR REMOVAL OF RETAINED THIRD MOLARS

The tissues overlying unerupted third molars may be incised and exposure of the bone obtained in many ways. For maxillary third molars the single incision (Fig. 11) is adequate in the majority of cases. With this one incision, if carried to the distal limit of the tuberosity, it is rarely necessary to injure the gingiva about the second molar. I should like to emphasize this point, as I believe it to be the one cause of many postoperative subperiosteal infections and abscesses which sometimes follow such an operation; not because the nutrition of the next tooth is disturbed, or that the tooth is in any way injured

that contraindicates such practice, but because it promoted an unnecessary locus of infection and I prefer not to disturb the gingival attachments in this region.

For mandibular third molars the buccal incision, starting from the disto-buccal corner of the second molar as shown in Fig. 12 will provide good visibility and preserve the adjoining tissues. The distal incision should be extended at least to a point equal in length to the tooth or slightly beyond. It should also follow the curvature of the internal oblique line, which is definitely buccal, and not straight back.

Fig. 14.

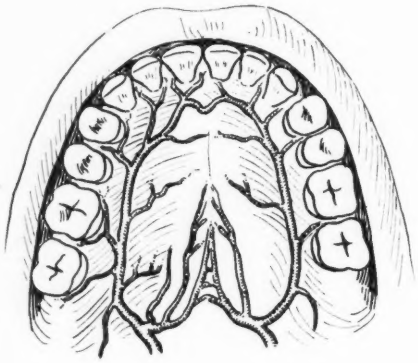
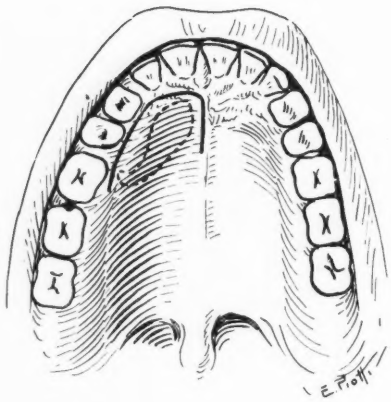


Fig. 15.



After the removal of the tooth this flap may be allowed to collapse into the cavity, a dressing may be placed over it, it may be sutured in position or left alone as the operator wishes.

Unless a third molar is lingually placed or completely unerupted, it is unnecessary to elevate the entire lingual or inside flap from the bone. I have found that if the tissues on the buccal and superior surfaces are separated, sufficient access is gained to remove the majority of unerupted third molars. To allow the lingual or palatal tissues to retain their original positions reduces operative and postoperative hemorrhage. If the incision is correct, we do not have to submit them to unnecessary handling for the sake of accessibility.

INCISIONS FOR THE REMOVAL OF RETAINED CANINES

Operating in the roof of the mouth for the removal of unerupted canines requires some understanding of the soft tissue structures. The hard palate is covered with a dense structure formed by periosteum and mucous membrane which are intimately adherent—more so than the mucoperiosteal tissues of other parts of the mouth. Along the middle line is a linear raphe which ends anteriorly in a small papilla corresponding with the incisive canal. The entire palate is furnished with numerous palatal glands. The vessels and nerves lie in the areolar tissue beneath the mucous membrane.

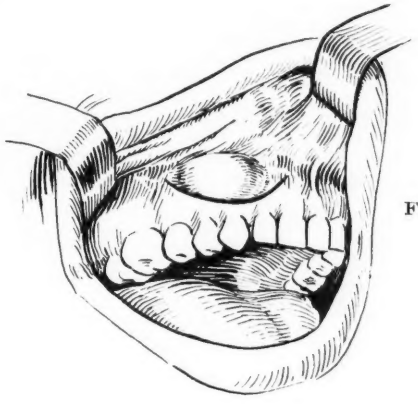


Fig. 16.

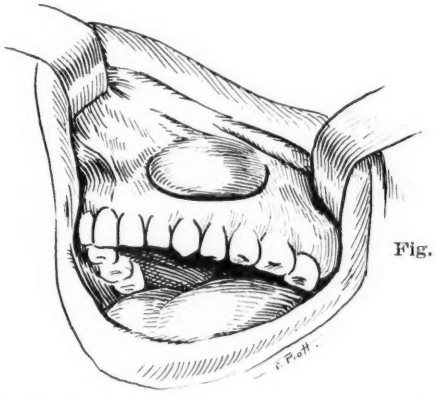


Fig. 17.

The descending palatine branch of the internal maxillary artery, emerging through the posterior palatine foramen, is the main source of blood supply to the palatal soft tissues. The actual part played by the nasopalatine branch in distributing blood to the palatal tissues is very small. Its main function is to supply the nasal septum. It anastomoses with the descending palatine at the incisive foramen. This is somewhat contrary to the generally accepted idea that the anterior third of the palate was dependent on the nasopalatine and the posterior two-thirds on the descending palatine branches. Injury to the nasopalatine branch at the incisive foramen is therefore not so serious as is generally considered. Fig. 14 illustrates this point—showing the very large descending

palatine artery supplying the entire palatal surface, with the possible exception of a very small area opposite the incisive foramen.

Fig. 15 shows the incision as it should be made for this operation. Sometimes the flap is elevated from around the necks of the teeth by first severing the interdental papilla with a sharp knife. If the unerupted tooth is close to the anterior teeth, so that injury to the remaining strip of tissue between the incision and the necks of the teeth is likely, it should be elevated in this manner, but only at the point of possible interference or trauma. The tissues of the palate are less susceptible to postoperative infections than are other areas, which is probably due to their resistant structure and efficient blood supply. A vertical

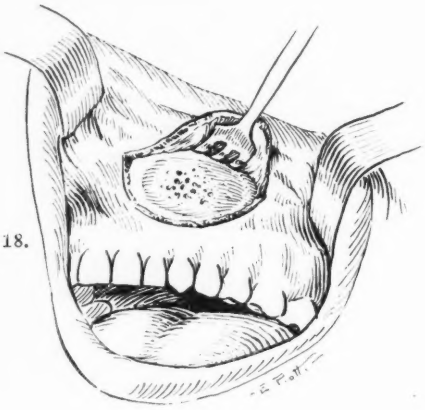


Fig. 18.

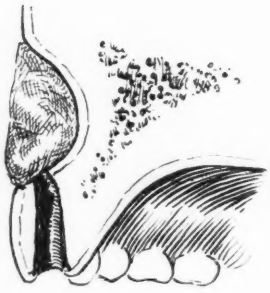


Fig. 19.

incision on the palatal side of the alveolar process is incorrect. Considerable hemorrhage and difficulty will be encountered with a cross incision at the premolar and molar regions—occasionally it being necessary to pack the posterior palatine foramen to arrest the hemorrhage.

Palatal flaps may be sutured or not. If the underlying bony table is wide enough to prevent the flap from falling out of position or into the wound, sutures may be unnecessary. If its original position cannot be maintained, one or two sutures should be used. I do not advise irrigation of these palatal wounds during the operation with antiseptic washes, as it will remove the blood serum and exudate on the underside of the flap, which, if retained, will help to stick the flap to the bone soon after its closure.

INCISIONS FOR CYSTS AND APICOECTOMY

The removal of cysts, tumors or root ends, as in apicoectomy, demands good visibility and a minimum amount of traumatization. The more common type of incision is the arc or straight type. On the upper jaw it is made opposite the lower limit of the diseased area, while on the lower jaw it is made somewhere between the labial fold and the gingival tissues. The curved incision when too short or when arced too greatly is more difficult to suture into proper adaptation, as it is prone to pull away or fall slack between the sutures unless many are used. We must remember that once a flap is separated from its bony attachments, it shrinks and will not return to its original position easily if the curvature of its edges is too great.

Sufficient tissue should remain between the necks of the teeth and the incision to insure adequate nourishment to the remaining soft tissue and to allow for suturing if necessary. (Fig. 16.) It is advisable that the remaining strip should never measure less than one centimeter in width at any one point. The inferior limit of the wound should correspond as closely to the lowest point of incision as is possible, to obtain proper drainage as well as to prevent traumatization.

For a modified Partsch operation the following technic is suggested: The incision should outline the limits of the cavity (Fig. 17), as compared with the previous illustration (Fig. 16) and technic, where it extended beyond its mesiodistal limits.

The field is exposed (Fig. 18), the bone removed and the cyst excised and instead of suturing the flap back into its original position it is placed at the base of the wound, and a packing is superimposed over it, encouraging it to adhere to the bony cavity (Fig. 19). The healing is accelerated by this method, but, as is readily seen, a depression or slight deformity is likely to persist.

CONCLUSIONS

Each surgical fundamental is essential in designing incisions, and it would be safe to say that if you were to inquire for reasons for operative failures, all could be answered by failure to observe one or all of the fundamental surgical principles. Failure to remove the entire tooth, pushing roots into the antrum, the cause of postoperative pain and infections, slowly convalescing wounds, and many other problems may be satisfactorily solved by recourse to proper surgical fundamentals.

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BACTERIAL ALLERGY (HYPERERGY) IN RELATION TO PARODONTAL DISEASE*

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THE relationship between allergy and parodontal disease is a relatively recent development. Allergy itself, as an etiologic factor in the production of various types of pathologic processes, has developed more in the past two decades than in the centuries in which some of its manifestations have been recognized.

The content of this paper will be limited to bacterial allergy or hyperergy in its relation to parodontal disturbances. In other articles, we have reported on various types of allergic manifestations in the oral cavity, and we have shown that where the parodontal tissues of a patient are sensitive to certain forms of protein a certain characteristic set of symptoms will be evident in the tissues.[1, 2]

Allergy is a term associated with the changes in tissues or organs resulting from hypersensitiveness of the cells to specific proteins or to the products of protein metabolism. In other words, there is a definite alteration of the protoplasm of the cell which renders it sensitive to proteins or the products of protein metabolism above the amino acid stage. Allergic reactions are evident in tissues containing smooth muscle, skin, and mucous membrane. We therefore must consider the surface skin of the body, mucous surfaces in various parts of the body, and the arterial system and tissues containing smooth muscle. One type of tissue may be sensitive to a certain protein, and another may be sensitive to an entirely unrelated protein. It can probably be stated that all of us have some tissue or organ which will demonstrate sensitivity to a particular protein if sometime during life such contact is made. The reaction may be evident clinically, it may be confused with a different condition, or it may be concurrent with some other pathologic manifestation. Allergic response may be induced by mechanical alteration of a tissue through mechanical or physical means. Diseases increasing the permeability of mucous membranes may allow for the passage of proteins above the amino acid stage to dialyze through the intestinal mucosa and thus be carried to susceptible tissues elsewhere in the body. Sensitivity of certain tissues to protein may occur at any time from birth onward. The allergic reaction will be evident whenever contact is made with the offending protein. Sensitivity may be acquired by ingestion of large amounts of foreign protein at a time when the permeability of the intestinal mucosa is increased. Sensitivity may be acquired in fetal life by ingestion of large amounts of a certain protein (milk) by the mother during pregnancy. It has been demon-

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strated that overfeeding during pregnancy will produce an excessive amount of antibodies in the mother which may be carried through the placenta into the fetus, thereby sensitizing the child.

Allergic reaction is manifested by (1) spasm of smooth muscle, (2) spasm of arteries, (3) spasm of arterioles, (4) capillary dilatation, (5) increased capillary permeability.

In studying diseases of the investing and supporting structures of the teeth we must consider (1) the tooth itself with its enamel, dentin, cementum, and pulp, (2) the alveolodental periosteum which is primarily responsible for the integrity of the tooth in the alveolus, (3) the alveolus with its bone for attachment for the alveolodental periosteum, (4) the supporting bone, (5) the investing tissues with the interdental papilla and the gingival epithelium, (6) the mucous tissue which completely lines the remainder of the oral cavity.

Before considering disease of these structures we must have a fundamental knowledge of the gross anatomy, the microscopic anatomy, and the physiology of these tissues. We must also have a knowledge of pathologic processes in general and particular knowledge of the changes which take place in the diseased oral structures.

We know from our microscopic anatomy that the supporting and investing tissues have a very rich and delicate blood supply. The physiologic activity of the structures demands a copious blood supply. We know, too, that any factor, localized or generalized, which interferes with the blood supply to any part will be productive of degenerative changes. These changes, while they may not be apparent, clinically, for a period of time, nevertheless are gradually taking place, and we see the end-result of a long series of these changes when we are aware, clinically, that there is a pathologic condition in a tissue or organ. The etiologic factor may be localized and mechanical, chemical, thermal, or bacterial. The etiologic factor may be generalized or located elsewhere in the body, and we may be seeing, in the mouth, merely one manifestation of a mechanical, chemical, thermal, or bacterial process in some unrelated structure. We may have a combination of the etiologic factors; we may have a systemic disturbance which, coupled with a local process, produces evidence of a pathologic condition. Regardless of the type of force behind the pathology, we must be intimately concerned with the reaction of the individual cell of the tissue. Any tissue must depend for integrity upon the complete physiologic function of the cells which compose it. Disruption of normal cellular activity is pathology. Whether such disruption is caused by lack of hormones, enzymes, nutritional necessities such as oxygen or dietary end-products, or by extraneous influences as bacterial endotoxins or exotoxins, the effect is the same, and if enough of the cells in a group are affected we have disease. When the etiologic factor is removed, if the tissue is capable of regeneration, we find nature building once again. The metabolic balance of the cell is restored, and normal irritability, growth, and reproduction are evident.

Treatment of disease should be treatment of the cell which is the constituent of the tissue. Until this thought can be placed irrevocably in the mind of the dentist, we shall continue to have the empirical forms of treatment, the blueprint methods, in spite of which most of our patients recover.

In studying allergy in relation to the gingival tissues we have merely transferred the findings of allergic reactions in other tissues to the dental tissues. The mucous tissues and gingivae of the oral cavity do not differ materially from similar types of tissue elsewhere in the body. They are subject, in the main, to the same influences as other similar tissues. The oral tissues, in fact, represent one of the best indices of health that we have. They are easily accessible for inspection, and their character is such that they often evidence changes elsewhere in the body before the patient is aware of them himself. As before stated the gingival blood supply is large and anything affecting the general circulation, whether nutritive, bacterial or endocrine, will leave its mark on these tissues. We see every day in our practices the elderly patient with exposure of the necks of the teeth. This probably represents two factors: (1) the normal elongation of the tooth from the socket as demonstrated by Gottlieb and also by Kronfeld, and (2) the loss of investing tissue which physiologically accompanies the cutting down of the blood supply generally in senility.

Our diagnosis of gingival allergy is made by obtaining blood smears from the gingival tissues. (3) This is done by stimulating the tissues, which are dried first, with a fine scaler, applying the slide directly to the drop of blood which exudes, and smearing on the slide with the edge of another slide. The slide is stained with Wright's methylene blue eosin preparation. As stated in other articles, we obtained differential blood counts from our first series of patients, but in the routine case now we do not deem this necessary. The slide is examined for eosinophile cells only for diagnosis. There are only two conditions which produce eosinophilia; these are parasitic infestation and allergy. Occasionally, the patient recovering from certain infections will display an increase of the cells in the general circulation, but these influences are easily ruled out by history. As stated in other articles, we have found that allergy in the gingival tissues represents a localized reaction. The oral cavity is ideally situated for the contacting of bacterial proteins through food contamination, finger contamination, and inhalation.

Bacteriologically, it is known that each bacterial organism has its own specific protein. This protein is in the protoplasm of the organism regardless of whether the organism is encapsulated or not. The encapsulated organism, of course, will display a specific reaction for its protein (inherent) and also produce a specific antibody for its capsular material. The capsule in most organisms is a polysaccharide. The specificity to the capsular material is important in hyperergy because the patient may be sensitive to the type organism (non-encapsulated) or he may be sensitive to the organism only when it is encapsulated. The pneumococcus is the classical example of this specificity of the capsular material. Thus, an individual may be sensitive to the pneumococcus group as a whole, demonstrating that he is sensitive to the protein which is common to the entire group; or he may be sensitive to Type 1, demonstrating that his sensitivity is confined to the capsular material which is peculiar to that particular strain of the organism. This differentiation is important in the treatment because unless the specificity of the organism is determined, treatment can only be general or by group treatment.

The above fact has been demonstrated in our work on allergic reaction in the parodontal tissues. The patient must be tested to ascertain the type and strain of organism to which he is sensitive before he can be desensitized.

It is possible in the individual sensitive to bacterial allergens to desensitize him. This process depends upon the elimination of antibodies to the particular organism to which he is sensitive. This is done by determining the dilution of bacteria to which no reaction appears and gradually increasing the dosage over a period of time. The result is that the individual gradually becomes desensitized and large numbers of organisms can be contacted without the production of symptoms or lesions.

Skin testing will usually demonstrate the type of organism which is offending. If skin testing does not indicate the offending allergen, we have waited until the mouth is normal and then applied various stock strains directly to the tissues and watched for reactions. This method requires considerable time and patience in some cases. Where this has failed we have cultured the organisms from the tissues during the height of an attack and then after the mouth was normal, have tested directly, with the predominating organism.

Case of bacterial hyperergy: C. A., aged twenty-six years, medical interne.

The general health of the patient was good, and the family history showed that the father had an asthmatic condition. There were no digestive disturbances. Canker spots had occurred only once.

The oral history revealed that the patient in last year of student training and in year of interning had been experiencing recurring and very acute attacks of gingivitis. Seven attacks in two years. These had been treated for Vincent's infection with little success. The lesions disappeared when he was away from the hospital for a period of time.

Oral examination showed a fairly well-cared-for mouth, with teeth in good condition. The gingival tissues were typical of very acute Vincent's infection. The breath was fetid, pain was constant, bleeding was apparent on talking. Gingival smears showed a typical picture of Vincent's organisms. Gingival blood showed a 27 per cent eosinophilia. Skin tests were positive for mushroom +, and for *Streptococcus hemolyticus* +++.

This case represented a problem in that it was necessary to eliminate a bacterial allergen which the patient in the nature of his work was probably constantly contacting. The patient was given a leave of absence from his hospital duties and went to his home. When the oral condition was completely cleared, he came in for treatment. A stock solution of *Streptococcus hemolyticus* was applied by swab to the gingival tissues opposite the lower central teeth. There was a marked erythema and burning within twenty-five minutes. The only course in this type of case is desensitization. This is done by determining the dilution of bacteria which causes no reaction and gradually increasing the dosage over a period of time. The result is that the patient eliminates antibodies until fairly large numbers of the bacteria can be contacted without the production of symptoms. It is now twenty-two months since his last attack, and he has been able to continue his career without interruption and with no oral lesions.

CONCLUSION

This case is typical of most of those in which bacterial protein seems to represent the direct etiologic factor in parodontal disease.

The majority of these cases are acute or subacute and have been classified as "chronic gingivitis," or as "chronic Vincent's infection."

Most of our patients with bacterial allergy have had occupations in which contact with various types of organisms is constant. We have found a good percentage of cases in dental students, medical students, medical internes, and nurses. History usually reveals development of a parodontal condition shortly after the individual goes into clinics or the ward, contacting patients with various types of bacterial infection.

We feel that any case of parodontitis which exhibits signs of chronicity should be carefully studied from all viewpoints. A chronic condition is usually an index that some unobserved, untreated, or intractable factor is present. In some of these cases hyperergy may be the underlying etiologic factor and should always be considered in routine examination and diagnosis of parodontal disease.

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Separation of the Permanent Upper Centrals. By Harold Chapman, Dental Record **61**: 249, 1936.

In instances in which the upper central incisors erupt with a space between them, it is important to be able to diagnose whether they will come together by themselves or will remain permanently separated. Surgical treatment consisting

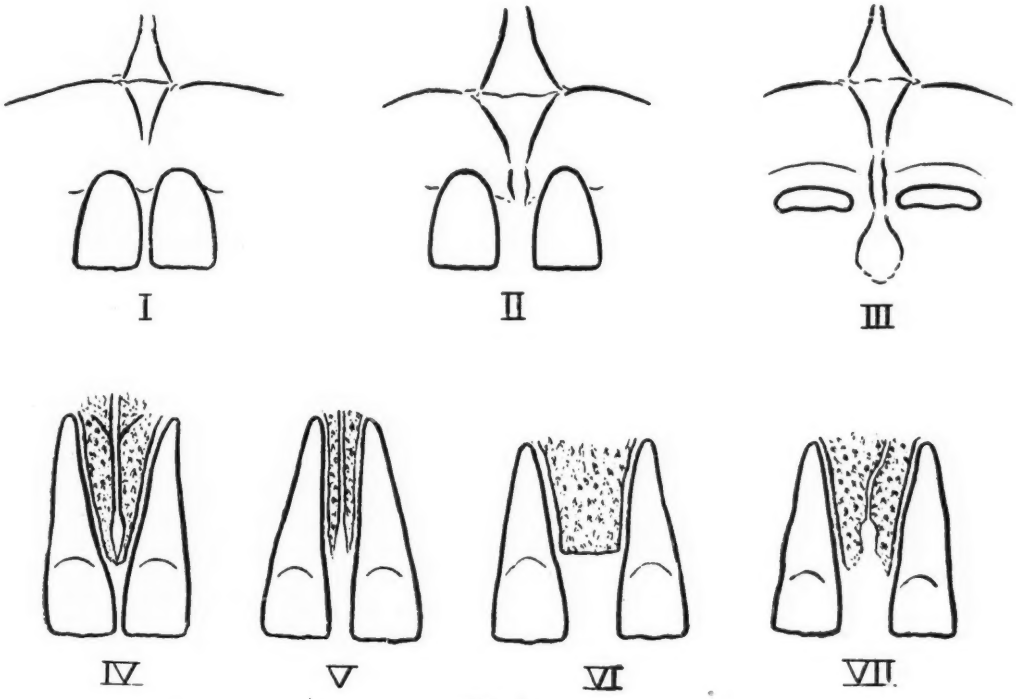

Fig. 1.

of the removal of the frenum or of the wedge of bone between the teeth is often advocated. However, before any operation is performed, one should know whether or not the condition is likely to correct itself.

In adults the bone between incisors which are in normal approximation reveals a calcified union between the two halves of the maxilla at the alveolar crest, forming a single point (Fig. 1, section IV). In the apical region there is less complete union. In children there appears a narrow gap between the two halves of the maxilla, but the crests of the alveolar bone come to a point on each side of the gap (V).

The appearance of the bone in conditions in which the central incisors are permanently separated reveals a solid block of cancellous bone covering the alveolar crest either completely (VI), or showing a V-shaped gap in the crest (VII). The crests do not come to a point but have square ends.

E. N.

Drinking Water and Teeth. By Eric C. Erskine Williams, British Dental Journal **60**: No. 4.

Drinking water should be free from taste, color, odor, without obvious suspensions, lacking contaminations, and have a certain quantity and quality of mineral contents. An excessive amount of mineral contents is responsible for diseases of the stomach, intestines, kidneys, and for the formation of salivary calculus. Deficiency in mineral salts promotes goiter, rickets, etc.

Clinical observations demonstrate the relationship between hardness of the local water (containing magnesium and calcium carbonates and chlorides) and native teeth.

In areas with a substrata of chalk and in villages with hard water impregnated with salt, the permanent teeth of the population are unusually good. They are well formed, strong, brittle, lustrous, and of yellow-white hue. The alveolar bone is dense and compact. The teeth possess a high immunity to decay, which is usually confined to one surface, narrow seamed and deeply penetrating.

In districts with soft water the structure of the teeth is adversely affected, as soft water is most times deficient in organic materials. The crowns are milk white in color, oyster shell in texture, smooth, and the jaw bones are more cancellous; movement of teeth in orthodontic treatment is accomplished with greater rapidity; they have inferior resistence to dental caries.

Hard water is found in the waters of South England where enormous quantities of chalk exist, in the hills of South Downs, the Chilterns, and London (where the hardness ratio of the water is 25), and in the Home Counties where even extreme deposits are found in cooking utensils, etc. On the other hand, Douglas, the Isle of Man, Liverpool, etc., receive soft lake water; Chester takes its water from Lake Bala (with a hardness rate of only one half of London water); and in many country hamlets the water supply is collected from rain water.

E. N.

Impacted Wisdom Tooth Causing Reflex Irritation of the Lungs. By W. L. Balendra, British Dental Journal **60**: No. 7.

The patient, a woman aged thirty-two years, gave a history of asthma. At the age of twenty-two years, she suffered the first attack, which lasted eight months. This attack followed a chill; it subsided with medical treatment. Ten years later the asthma recurred following chickenpox. It took the form of spasms lasting about three minutes, more frequent at nights. The spasm started with a scratchy feeling in the throat, but there was no pain in the region of the third molars. Medical treatment for over one year and cauterization of the tonsils did not improve the condition.

Dental examination revealed a normal, complete set of teeth. The mandibulary left third molar was in a horizontally impacted position. After the removal of the left second and third molars, the asthmatic attacks disappeared almost instantly and did not recur. It is obvious that this result was not due to a protein sensitization accompanying the extraction, because a similar stimulus on the occasion of the tonsil cauterization was without effect. The case shows again the importance of eliminating all suspicious sources of irritation in the mouth in conditions of long-standing coughs and asthma.

E. N.

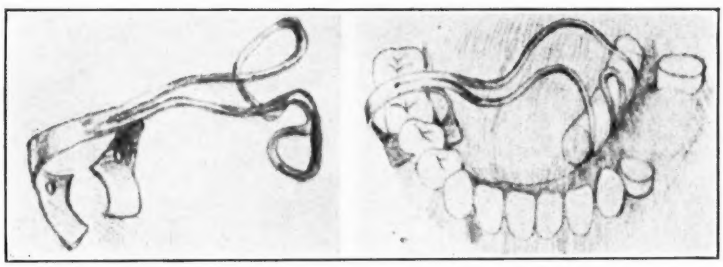

Fig. 1. Fig. 2.

A New Tongue Holder. By Dr. Fitz Schon, Zeitschrift für Stomatologie, January, 1936.

This holder is used to keep the tongue away from mandibulary molars or premolars when they have to be kept dry for cementation. It consists of a clamp which is attached to the posterior teeth of the opposite side, and of a wire arm which encircles the tongue. The arm is made of flexible wire, can be stretched for a larger mouth, and bent together for a smaller mouth (Fig. 1). The holder can be used either with or without a cotton roll. The upward curvature of the wire arm provides space for the tongue and allows it to lie quieter than does a tongue depressor or mirror held by an assistant (Fig. 2).

E. N.

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Editorials

A World Orthodontic Tour

"To me, the acceptance of an obligation to unravel further the tangled skein of maldevelopment in the human dentition by the simple expedient of clinical research, is the bounden duty of all orthodontists. Orthodontists have, with some justice, been accused of not being scientific in their outlook and practice, and this criticism can best be countered by their continued efforts to remove empiricism from practice, mere mechanics from treatment, and unproved notions from etiology.

"The teachings and conceptions of Dr. Angle have done more than anything else to establish orthodontics as a distinct profession. That he was not right all the time in no way lessens his greatness, and the monument he erected

will only suffer if his followers accept blindly everything that has gone before, both in theory and practice, and, remaining content with what has been taught them, be unmindful of the very valuable work that has been and is being done by other workers in their field."

So concluded Arthur Thornton Taylor, B.D.S., D.D.S., of Sydney, Australia, in the *Angle Orthodontist*, October, 1935. Dr. Taylor had just completed a trip around the world, during which journey he visited the offices of many well-known orthodontists in various parts of the globe. The author indicated that he started the journey with an entirely open mind and that he made it his business to visit orthodontists and those interested in the subject in as many places as possible during the course of the journey and so far as the time allotted would permit him.

After this interesting and educational experience, Dr. Taylor's comments are illuminating. He reported much controversy and bitter conflict of opinion in all departments of the specialty, as well as no agreement of opinion pertaining to etiology or to theory and technic of treatment or as to the meaning of orthodontics or orthodontia. He points out that one school talks grandiloquently of ideals and ideal treatment, and yet examination of their results does not square with the ideals, that the best technicians have the least scientific background, that the so-called scientific men often employ the same technical equipment with which they started to practice because of their absorption in theories. It is evident that the author believes there is much to be desired in modern, up-to-date technic.

Other excerpts from the paper reveal speculation: "Many skillful and experienced orthodontists, I found, were quite pessimistic about present trends in orthodontics, but in recording these opinions, I do not wish to sound unduly gloomy about the status of orthodontics or the prospects for its future. I feel that orthodontia is a very lusty infant, suffering somewhat acutely from growing pains, but I believe that its work has been justified to date, and does not really deserve the occasional indictments that one hears from some sources in relation to this work.

"However, I learned sufficient and appreciated enough points of view to feel that humility and earnest striving in all departments of our work is the only attitude that can, at present, be justifiably maintained.

"I am purposely leaving personalities out of this discussion, but because I am addressing the Angle group I want to say very sincerely that I believe their present conceptions in general need to be seriously and conscientiously examined. I can assure them that they are not in any plane apart—I feel that an examination of a cross-section of their work reveals that many others, equally conscientious, equally skillful, with similar ideals of treatment in a general sense, can compare quite favorably with them.

"Perhaps as a 'foreigner,' I should not have said this, perhaps it is none of my business, but as an Angle graduate and appreciative of the ideals of the Angle school, I am sincere in my plea for a more tolerant attitude among orthodontists generally."

Concerning the subject of etiology, he found nothing new since Brash; however he paid tribute to Korkhaus, Broadbent, and Price in this field, but

neglected to mention the new and highly important work of Howard. Pertaining to treatment, he points out that in informal discussions often he was made to feel that the patient should be pitied because of the mechanical devices to which he (the patient) must submit; and he goes on to say that the perfect appliance is far from a reality at the present time. Still other impressions are gleaned—that a very weak link in the chain of orthodontic practice is the problem of anchorage; that the technic of an operator does not matter as much as does his mental concept of the job in hand, in other words, whether or not he knows what he is attempting to do.

Referring to the relative merits of the much mooted Angle ribbon and edgewise arch technic, about which shrine there has evolved so much almost religious emotion and intolerance of other technics, he says: "Perhaps I may be excused if in this discussion I offer some observations on the technique of the Angle group, believing that within certain limits, the technique of the pin and tube, ribbon arch and edgewise arch mechanisms does not materially differ.

"For the most part, these operators have a very good conception of anchorage in a static sense. The anchorage is generally quite stable, being well dispersed for, of course, with the new mechanism, most men, as was taught, band every tooth. This slavish adoption of the principle of 'complete anchorage,' to me is not, in all cases, good treatment, and in many cases is definitely bad treatment, particularly with those men who, regardless of the physiological age of the denture and the development of the roots of the erupting teeth, place bands on all teeth possible in the desire for 'complete stationary anchorage.'

"Again, this mass anchorage leads to much trouble in many cases in an attempt to attain backward movement. In a broad view of the application of the 'Angle technique,' I came to the conclusion that there is very little mass distal movement attained by it. Only re-examination of results, years after treatment and then years after that, and publication of failures as well as successes, will convince the profession generally and the public that distal *mass movement* can be attained by this technique.

"While I must admit that I did see some nice cases and the dentures were nicely balanced and the facial lines harmonious, yet I fear that the percentage of prognathism was unfortunately high, and should give cause for earnest examination of the technique in question in these cases.

"I was impressed by the difference in the conception of different orthodontists as to what constituted balance within the denture—the attainment of harmony with the 'line of occlusion.' Among good men, keen and earnest workers, one could see really surprising variations and contrasts in their conception of the normal. Granting that at the present stage of our knowledge, this conception of the normal must rest with the individual, the amount of variation suggests strongly the need for a re-examination of our methods of determining this knowledge, and the means of arriving at it. Orthodontists are still attempting the impossible in many cases in pursuit of the 'ideal,' and subjecting their patients to far more trouble than they (the patients) deserve.

"The realisation of our limitations in treatment is very important, for to my mind a good technique can be spoiled and prejudiced by its unconsidered or faulty application."

While being only an excerpt from Dr. Taylor's article, this obviously reflects a sincere and conscientious effort to reveal at least one man's perspective or a cross-section of orthodontic practice throughout the world as it is practiced today. When Dr. Taylor says that orthodontia is a lusty infant suffering from growing pains at this time, he explains much of the wide variation of opinion among men who are spending their lives in the practice of the specialty. When he mentions the word "intolerance," he again mentions an important reason for divergence of viewpoint in orthodontic practice.

In the American theatrical skit called "The Two Black Crows," one comedian makes several staccato sounds on his trumpet and the comedian playing opposite sharply retorts that he would "not like the sound even if it was good"; so it is with prejudice. In orthodontic practice, regardless of whether good or bad, if the mind is decided, there is little use to prove the point in question; it will mean nothing.

There are other reasons for this unfortunate situation. Even today there are two distinct chains of thought in what might be called, for want of a better term, the orthodontic landscape. There is that chain which loudly proclaims that practice is nonmechanical and contends that orthodontic appliances are plebeian in character and should be mentioned only in a whisper. They want to believe, regardless of what the evidence of the past may reveal, that mechanics in practice is only a necessary evil like a corkscrew to a bottle, and that if we become sufficiently advanced scientifically, ultimately malocclusion will be corrected by some kind of diet, combined with the anticipated fertilization of the original chromosomes of the prospective patient. They do not care for mechanical-minded programs in orthodontic societies; they prefer something more scientific. They ignore the fact that in orthodontic history, up to now, the cleverest orthodontists have been those whose records of corrections and accomplishment have stood the test of years, have been precision men—both precision minded and precision mechanics. They have been careful, painstaking, industrious individuals who believed that it required clever mechanical maneuvering to do a dexterous job of correcting malocclusion and making it stay corrected.

On the other hand, there is a group whose concept of the subject is entirely different. They ignore the facts that orthodontic practice has for its foundation living, pulsating, growing, biologic tissue and that the biologic phenomena of this tissue must be well understood before one can hope to accomplish much mechanically in changing it. This concept of orthodontic practice begins with an appliance and ends there—bands, wires and screws as a means to an end; etiology, diagnosis, health and disease are secondary. Both concepts are extremes, and one is about as bad as the other.

A back-to-earth movement in orthodontic practice would no doubt be a progressive move at this time; in other words, the two extremes of thought should migrate to a more sane, middle ground—good mechanical men and good doctors should merge and pool their interests for the good of orthodontic

practice. Let good theoretical men think more about "straightening teeth" and good mechanical men think less about whether they use a Ford or a Chevrolet for an appliance and more about what the results will be ten years after treatment regardless of the appliance used.

Years ago Ottolengui wrote in his round table discussions: "Much has been said and much has been written about the etiology of malocclusion. But if you really want to know how teeth that are in good alignment gradually move into malocclusion permit me to refer you to some conscientious general practitioner who has tried to practice orthodontia for patients who keep coming back for regular dentistry."

That particular observation written by a man who had observed the birth of the orthodontic specialty coincides with the theme of Dr. Taylor's article written last year, subsequent to his world contact with orthodontia; namely, that there is still so much to learn about orthodontic theory and practice that the first one hundred years of practice will only scratch the surface of what is yet to come. There is a back-to-earth movement in orthodontia—to a tolerant, sensible view of the other fellow's work and viewpoint.

The orthodontist who makes a habit of knocking the work of another, who tries to destroy the patient's confidence in the services previously rendered by another, who attempts to sell himself by ridiculing the other fellow, in fact, who tears down instead of builds up, has frequently been referred to informally in orthodontic practice as an orthodontic "ghoul." Under the general head of synonyms and antonyms, it is found that ghoul, as a noun, has a meaning similar to that of the noun "vampire," and vampire has two synonyms: extortionist and bloodsucker.

Those who encourage the practice of orthodontic ghouling will no doubt answer this comment by saying that little children must be protected from incompetent service. The answer to that retort is contained in Dr. Taylor's comments written after his world orthodontic tour. Until orthodontists collectively as specialists are able to agree (in some degree at least) on what competent service is—on who is and who is not competent—let no individual or group labor under the delusion that he, or they, or their methods are the final answer to all orthodontic problems of treatment.

For the good of the specialty, in order that orthodontia may once and for all cast aside this childish mud slinging, let its workers discontinue the sophomoric practice of tearing down. The time has arrived when all must pull together, if not for the good of the individual, then for the good of the whole. Dr. Taylor's comments will no doubt be a constructive influence on the future progress of the specialty because in them one senses that there is not only honest difference of opinion in the specialty, which is a wholesome situation, but also much of the atmosphere of children playing in the sand, which is an unwholesome, unprogressive, and unscientific situation.

H. C. P.

Educational Moving Picture for Orthodontia

SOMETHING new in the way of orthodontic education for the layman and for office or classroom instruction has been created by Thomas B. McCrum, D.D.S., of Kansas City, Missouri. It is in the form of a sixteen m.m. moving picture which requires about sixteen minutes for projection.

The film, entitled "Betty's Crooked Teeth," opens with a classroom scene in the seventh grade. An underprivileged or handicapped child is shown, revealing a bad and unsightly case of malocclusion. The child is plainly perturbed as to whether or not it will be necessary for her to continue throughout her lifetime with this deformity. A close-up shot directly into her mouth shows the so-called crooked teeth as they actually appear to the casual observer. An educational dialogue is conducted in which it is pointed out that it is quite possible to correct conditions of this kind in children's mouths, and that to do so requires a period of months of systematic and careful treatment. Another scene shows the same child after appliances are adjusted, and subsequent shots are taken periodically during the course of treatment. A shot is taken at the completion of the case and shows the patient with a normal occlusion of the teeth. In the last scene of the picture the patient appears as a matured young lady, holding down a responsible position as secretary, greeting the customers with a happy "dental" smile, and exposing an occlusion and a symmetry of teeth which would be the envy of the advertising manager for any tooth paste or even of a particular and painstaking orthodontist.

The film is of interest because it is new, because it has apparently taken a number of years to prepare, and because it tells the orthodontic story in sixteen minutes.

H. C. P.

In Memoriam

IN MEMORIAM RESOLUTION OF THE AMERICAN BOARD OF ORTHODONTIA

Albert H. Ketcham

The members of the American Board of Orthodontia, assembled at St. Louis for the regular 1936 session of the Board, are keenly aware of the absence of our beloved friend and former president, Dr. Albert H. Ketcham.

The organization of our Board in 1929 at Estes Park and the successive steps in its signal progress since that time are very largely due to Dr. Ketcham's inspiration and tireless labor directed toward the advancement of the specialty of orthodontia.

We lack words with which adequately to express our great admiration and respect for his unusual ability and for his unflagging persistence under physical handicaps that might have discouraged most of his fellow Board members. The motto "Service Before Self" was never better exemplified. His unlimited capacity for friendship endeared him to all.

Albert H. Ketcham possessed a scientific, inquiring mind. His desire to give to others from his own rich experience, at whatever degree of personal sacrifice, was one of his outstanding qualities. For all these qualities and because of his lifetime of constructive work, he will ever be remembered by all who enjoyed his acquaintance or friendship. Be it therefore

Resolved, That the foregoing be spread upon the minutes of the American Board of Orthodontia, that the same be published in our professional journals, and that a copy be sent to Dr. Ketcham's family.

Albert W. Crosby,
B. Frank Gray.

News and Notes

American Society of Orthodontists

The thirty-fifth annual meeting of the American Society of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, April 19-22, 1937.

PAUL G. SPENCER, President,
1817 Austin Avenue,
Waco, Texas.

CLAUDE R. WOOD, Secretary,
608 Medical Arts Bldg.,
Knoxville, Tenn.

Southern Society of Orthodontists

The fifteenth annual meeting of the Southern Society of Orthodontists will be held at the Atlanta Biltmore Hotel, Atlanta, Ga., on January 25, 26, and 27, 1937. All ethical members of the dental and medical professions are cordially invited.

WILLIAM A. CLARK, President,
Medical Arts Bldg.,
Atlanta, Ga.

WILLIAM P. WOOD, JR., Secretary,
442 West Lafayette Street,
Tampa, Fla.

New York Society of Orthodontists

The fall meeting of the New York Society of Orthodontists will be held November 23 and 24 in New York City at the Waldorf Astoria Hotel.

HENRY U. BARBER, JR., President,
5 East 57th Street,
New York, N. Y.

FRANKLIN A. SQUIRES, Secretary,
Medical Centre,
White Plains, N. Y.

North Atlantic Orthodontic Society

The next meeting of the North Atlantic Orthodontic Society will be held in New York City, Wednesday, December 16, at the Hotel Pennsylvania.

Registration will be held at 9:30 A.M. The morning session will consist of case reports and an essay; the afternoon session, of table clinics; and the evening session will be devoted to two essays.

Members of the dental profession are cordially invited.

JAY M. CORNELL, President.

EDWARD A. LUSTERMAN, Secretary,
185 West End Avenue,
Brooklyn, N. Y.